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A

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Devoted to the Interests of the Profession.

EDITED BY

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THE

DENTAL COSMOS.

VOL. LVI. JANUARY 1914. No. 1.

ORIGINAL COMMUNICATIONS.

A RECONSIDERATION OF THE ETIOLOGY OF DENTAL CARIES, AND A NEW THEORY OF CARIES SUSCEPTIBILITY.

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(Read before the Toronto Dental Society, November 29, 1913.)

IN his work on Operative Dentistry, in discussing the historical features of caries of the teeth, Dr. G. V. Black presents a photographic reproduction from an old German work published anonymously in 1530, the original of which is part of my private collection of dental literature and constitutes probably the oldest record, at least in a separate dental publication, of a theory of dental decay which doubtless had its beginnings in the remotest antiquity, and which in its essential features expresses the theory of dental caries generally accepted today.* The translation of the paragraph referred to is as follows: "Caries is a disease and defect of the teeth in which they become full of holes and hollow, which most often affects the molars (*Backenzähne*), especially if one eats and does not clean them of the adhering food, which decomposes, producing a bad acid moisture which eats them and corrodes them out, increasing continually little by little so that it destroys the teeth entirely, which thereupon finally rot away in pieces, not without pain."

EARLY THEORIES REGARDING THE ETIOLOGY OF DENTAL CARIES.

Various other theories have been proposed in explanation of tooth caries, but none has received the extensive acceptance over so long a period of time as that embodied in the foregoing quotation; and justly so, for its conclusions were derived from widespread and intelligent observation.

In the closing quarter of the nineteenth century, interest in the problem of dental caries had progressed to a point where its serious study was being undertaken and scientific methods were beginning to be applied as the means for its solution. Of this the work of Leber and Rottenstein, of Magitot, and of Underwood and Milles, are notable examples, the valuable researches of the last-named

* G. V. Black, "Operative Dentistry," vol. i, page 60.

having been presented before the Dental Section of the International Medical Congress in London in 1881. The communication of these investigators served to actively revive an interest in the germ theory of dental decay, inasmuch as they brought out the close relationship of bacteria to caries—for they noted the constant presence of micro-organisms in decaying dentin, and the widening of the tubules produced by them; and they stated as their conviction that in the decay of the hard tooth structures, "Two factors have always been in operation, (1) the action of acids, and (2) the action of germs"; and they say further, "This theory, which for the sake of distinction may be called the septic, is rather an amplification of the chemical theory than a contradiction of it. Most probably the work of decalcification is entirely performed by the action of acids, but these acids are, we think, secreted by the germs themselves, *and the organic fibrils upon which the organisms feed and in which they multiply are the scene of the manufacture of their characteristic acids, which in turn decalcify the matrix and discolor the whole mass.*" (Italics mine.)

It will be readily seen from the foregoing that Underwood and Milles were, to use a colloquialism, "hot on the trail" of the decalcifying agency concerned in the process of tooth decay, in which connection I wish to particularly direct your attention to the closing lines of the paragraph just quoted relating to the organic fibrils being the scene of manufacture of the characteristic acids of bacterial activity, a point of importance to which I shall take occasion to refer later in this paper.

MILLER'S STUDIES OF CARIES.

In 1882-83 and thereafter, W. D. Miller of Berlin began the publication of a series of papers, the first in *Klebs' Archives,* detailing his experiments and his conclusions therefrom, constituting a report of his researches into the nature of the carious process, and particularly as to the mode of production of the decalcifying agent concerned in that process, with the well-known result that Miller proved incontestably that the acid which was the active decalcifying agent is lactic acid produced through the ferment agency of certain classes of bacteria that have the power to split up monosaccharids into lactic acid. The brilliancy of his research and the definiteness of his conclusions secured for them practically universal acceptance, thus sealing with scientific approval the ancient theory of decay which I have already quoted from the old book record in the beginning of this paper.

In all of Miller's experiments having for their object the artificial reproduction of dental caries, it will be noted that he worked with a culture medium the basis of which was some form of starchy foodstuff; and a careful study of all of his work in connection with dental caries shows that he was dominated by the idea that caries of the teeth is produced in its first stages by the fermentation of adherent alimentary carbohydrate food débris, and as a matter of fact by subjecting the alimentary carbohydrate food material to fermentation through the agency of mouth bacteria; and, by immersing sections of sound tooth structure in the culture media so prepared, he was able to reproduce the carious process in both dentin and enamel in a way which so perfectly simulated tooth decay produced under normal conditions in the mouth, that careful and competent scientific observers were unable to detect the difference either macroscopically or microscopically.*

Miller died in July 1907. His later scientific communications in so far as they were related to the problem of dental caries did not deal directly with its etiology, as he apparently regarded his earlier researches on that point as being conclusive—for, writing in 1900, he says:

> Caries results from the accumulation and retention of particles of food between or in fissures, depressions, etc., upon the free surfaces of the teeth, which places we call *retention centers.* If, in filling a cavity in a tooth,

* Miller, "Micro-organisms of the Human Mouth," p. 196.

we do not thereby obliterate the retention center which previously gave rise to decay, there is every reason to suppose that decay may make its reappearance in the course of time.

THE PROBLEM OF SUSCEPTIBILITY AND IMMUNITY TO CARIES.

The suggestion had been made to Miller by myself and in my published articles, notably in a communication read before the Ohio State Dental Society in 1902,* and recently in a paper read before the Michigan Dental Society,† that susceptibility to caries might possibly be conditioned upon the presence in the saliva of a dissolved carbohydrate, the product of metabolism, and not wholly upon the débris of alimentary carbohydrates in the mouth. This suggestion was rejected by Miller after he had made some experiments to determine the possibility of the occurrence of a metabolic carbohydrate in the saliva.‡

It will be readily seen that the scientific confirmation which the researches of Miller gave to an easily understandable and widely accepted theory of tooth decay served to fasten almost indelibly upon the minds of all the belief that caries of the teeth is produced by fermentation of adherent food particles, and it is equally clear that belief in that view of the case has become the parent of the axiom that "Clean teeth will not decay"; and furthermore, it is clear that belief in the axiom that clean teeth will not decay is also the essential *motif* of the argument in favor of and the justification for the oral hygiene propaganda that has lately assumed such imposing proportions—so imposing, in fact, that it may seem to be an act of temerity on my part to even question for a moment the soundness of that doctrine; but I essay the task with hopefulness, because it appears to me to be one of those movements which has survived thus far because it is based upon a doctrine which has within itself a large modicum of truth, and which will survive eternally when it is shorn of its equally large modicum of error.

That Miller realized that his researches did not account for all of the phenomena of decay is clearly evident from his writings, for during the later years of his active life his attention was focused directly upon the problem of susceptibility and immunity to decay, and his studies were directed toward the task of harmonizing what he had already discovered about the etiology of dental caries with certain obscure features of the problem which did not seem to be explainable upon the basis of the conclusions which he had already reached. Briefly stated, Miller's researches have failed to explain the generally recognized phenomenon of variability in the susceptibility to caries.

Every practitioner knows that susceptibility to caries is not unlike the valor of Bob Acres, in that it is "a thing that comes and goes." So clearly and so broadly is this fact recognized that it is generally conceded among practitioners of dentistry that youth is the period of greatest susceptibility, and that, assuming normal conditions of health, the tendency to dental caries is markedly diminished, if indeed a period of immunity does not normally supervene, when adult age has been reached. It is also an equally well established fact that pregnancy tends to inaugurate a period of susceptibility to dental caries. The old axiom "For every child a tooth" has its equivalent expression in practically all civilized languages. It is also known from wide clinical observation that dental caries is not necessarily a filth disease. Some teeth kept as clean as patient and dental operator can keep them will decay, and decay recurrently. Other teeth in mouths into which the tooth-brush has never entered, and which are offensively filthy, do not decay, albeit they may show other manifestations of a pathological character. Our theory of the etiology of dental caries must therefore be sufficiently comprehensive to fairly ex-

* *Dental Summary,* 1903.

† "The Problem of Dental Caries," *Dental Summary,* December 1913.

‡ DENTAL COSMOS, VOL. xlv, p. 694.

plain these peculiarities, otherwise we have not arrived at the whole truth about dental caries.

That Miller himself realized that other factors must be taken into account is evident from the statement which I find in one of his papers published in 1900,* wherein he says, among other things: "The task which the dental investigator has before him today in dealing with the problem of dental caries is a far easier and simpler one than the pioneers had to deal with," and in reference to caries of the enamel he says:†

> In my book, "Micro-organisms of the Human Mouth," my account of the process of dental caries begins with the enamel cuticle. I distinctly called attention to the fact that the enamel cuticle in the early stages of caries forms a matrix for innumerable numbers of bacteria, and that the thickening of the enamel cuticle is due to growths of bacteria in this matrix. In the last stages of decay—*i.e.* of the enamel cuticle—we see only a mass of bacteria (cocci, rods, and threads), which is held together by the remnant of the membrane. The membrane in this condition affords a matrix for bacteria, as well as for very minute particles of food, and thereby accelerates the progress of decay. This growth of bacteria in the enamel cuticle may possibly coincide with the film of Williams, although such films are not restricted to the surface of the enamel. Williams, Black, and others incline to the view that this film is necessary to the origin of caries, a point on which I am not yet quite convinced, as my observations would lead me to think that wherever food finds a permanent lodging-place between the teeth to undergo acid fermentation, there decalcification is bound to take place in course of time, whether there be a film present or not.

It is interesting to note in connection with the foregoing quotation two things: First, that the fermentation of food particles as the cause of the beginning of caries of the enamel is the dominant thought in the mind of Miller, and yet curiously enough he offers no explanation whatsoever of his statement that the enamel cuticle is first disintegrated by bacterial action, and that in this disintegrated magma of enamel cuticle, carbohydrate food particles lodge and further accelerate the process. One might well ask, What really originated the process? How did the enamel cuticle disintegrate under the ferment action of bacteria before it was reduced to a condition in which alimentary carbohydrate débris could find a lodgment within the mass? Believing as he did in his theory of fermentation of carbohydrate food débris as the initial factor in caries production, he was naturally inclined to the view that the absence of carbohydrate food débris would mean the absence of caries production. He had already shown, and others have confirmed the fact, that lactic-acid-producing bacteria are practically constant inhabitants of the human mouth, both in those susceptible and those immune to dental caries; and in explanation of that fact he was inclined to lay stress upon the food habit of the individual as influencing susceptibility and immunity to caries—for, referring to his "Micro-organisms of the Human Mouth," he says:*

> Many years ago I called attention to the fact that the course of fermentation depends frequently more upon the substratum than upon the micro-organism. Bacteria which grow upon white of egg, producing an intensely offensive smell and strong alkaline reaction, when brought into carbohydrates exhibit entirely different phenomena—viz, acid reaction and total absence of bad smell.

Miller had previously discussed this view in the *Independent Practitioner,* in 1885, as well as in his book, and in various places later he had used it as the basis of his own explanation of the comparative immunity of meat-eating races, Eskimos, etc., also of the fact that caries does not take place in canals of teeth containing putrid pulps, and he also explained on the same ground the fact that persons of uncleanly habits may have very foul mouths and yet

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* DENTAL COSMOS, vol. xlii, p. 858: "Some Recent Contributions to the Study of the Decay of the Teeth."

† *Ibid.*

* DENTAL COSMOS, vol. xlii, p. 859: "Some Recent Contributions to the Study of the Decay of the Teeth."

little caries when they live chiefly on animal food, and when, through accumulations of tartar, etc., the gums are kept in an irritated condition, and their secretions and exudations, being albuminous, undergo alkaline fermentation.

Various observers have sought an explanation of the variation as to susceptibility to dental caries, in the difference in structural character or density of the teeth themselves. Prominent among these may be mentioned Carl Röse, whose extensive study of the subject is a classic in our literature. In the light of Miller's findings, and particularly in view of the exhaustive researches of Black, I think we may safely agree that differences in structure or density of the teeth are without influence in originating dental caries, and are factors that can only modify the rate of progress of the process. It is, therefore, undoubtedly true that the hardest teeth will decay in a carious environment, and that even the frailest teeth will not decay in a non-carious environment.

That food habit is a pronounced and important factor in determining susceptibility and immunity is generally conceded, though there are many instances of individuals and races of people whose diet is almost entirely carbohydrate, and who yet do not suffer more from caries than those who live upon a mixed diet. Investigations of food habit have not thus far revealed the principal factor upon which either susceptibility or immunity can be satisfactorily explained. How, then, may food habit modify susceptibility?

MICHAELS' SIALO-SEMEIOLOGY.

In several communications, notably those already referred to as having been read before the Ohio State Dental Society in 1902 and before the Michigan State Society in 1913, I called attention to the probable existence of a fermentable carbohydrate substance in the saliva, the result of carbohydrate metabolism derived from the blood through the medium of the salivary glands. My attention was first directed to this matter in some studies of the saliva that I made in the laboratory with Joseph Porter Michaels in Paris in 1901. One of the routine tests made by Michaels in the examination of all specimens of saliva submitted to him was what he called the glycogen test, and I find in my notes made at the time that glycogen, according to Michaels, had been detected in the saliva by Salomon, and that other carbohydrate substances—for example, glucose—had been detected by Lecorché, Pavy, Lehmann, Jordeo, Nasse, Koch, and Gorup-Besanez, and that Arthus had determined the presence in the saliva of erythrodextrin, achroödextrin, and of maltose, and Michaels says: "I have myself determined the presence of sugar in the saliva of diabetics. Glucose takes a red coloration with Nessler's reagent, which passes into a grayish blue."* He says, further:† "The difference of opinion relative to the passage of sugar into the saliva and the perspiration is explainable as follows: Sugar passes with difficulty into the saliva, and it is not apparent in appreciable quantities except in pronounced diabetics. The saliva contains large quantities of bacteria, and unless certain precautions are taken the contained sugar disappears by fermentation. The albuminous substances may interfere with the fermentation. According to Claude Bernard, cane sugar injected into the blood does not pass into the pathological saliva." "The saliva of diabetics is found to be acid by the presence of lactic acid."

The presence of a fermentable carbohydrate as a part of the salivary composition is a question of fact which, despite the statements of the authorities quoted, needs to be fully investigated both qualitatively and quantitatively in the light of the importance of its bearing upon the question of the etiology of dental caries. That the saliva, particularly of caries susceptibles, does contain a carbohydrate substance capable

* Michaels, *Trans. Fourth Internat. Dental Congress*, vol. i, p. 333.

† *Trans. Third Internat. Dental Congress*, Paris, 1900, vol. ii, p. 89.

of reducing Fehling's solution and likewise capable of fermentation, I have determined to my own satisfaction. The bearing which this fact may have upon susceptibility to dental caries is as yet an indeterminate question, but one of such important significance as to demand thorough investigation.

From the beginning of my studies of this phase of the subject in 1900 I have always doubted the existence of glycogen in the saliva, or at least doubted that glycogen could be the metabolic carbohydrate dissolved in the saliva as manifested by the tests employed by Michaels to detect its presence. The chemical and physical properties of glycogen are such as to practically exclude its presence from the saliva by a process of dialysis through the salivary glandular structure—and, so far as I am aware, no one has ever discovered that any of the salivary glands possess an independent glycogenic function. The activities of this dissolved carbohydrate, when it exists, correspond more closely to those of glucose than they do to glycogen, and that this metabolic carbohydrate in the saliva is a sugar, and not glycogen, seems to be strongly indicated by subsequent collateral investigation to which I shall refer later.

Miller undertook a series of experiments to determine whether the saliva possesses bactericidal properties, and if so whether *inter alia* the bactericidal properties of the saliva exist in a more marked degree in persons immune to caries than in those highly susceptible; in which connection he says:

> The saliva of immunes *as a rule* produces less acid by fermentation in a given time, especially in the first twenty-four hours, than the saliva of susceptible persons. The difference was, however, not constant, and I have sometimes found in the former case quite as high a degree of acidity as in the latter; and in some cases, indeed, the saliva of the highly susceptible person has produced less acid than that of a comparatively immune.

And in commenting upon the foregoing observation he says:

> We have here a factor which should not be altogether overlooked, although it is certainly not of sufficient importance to account for the immunity in one case and the susceptibility of the other. I am not quite prepared to state why the saliva of one person more readily undergoes fermentation than that of another, and shall reserve a further discussion of the question for a later occasion. Naturally the reaction of the saliva at the beginning of the experiment, as well as the presence of certain salts—in particular, carbonates—influence the amount of free acid appearing in the first twenty-four hours.

THE BEARING OF CARBOHYDRATE METABOLISM ON THE CAUSATION OF CARIES.

Unfortunately, the future occasion when Miller could focus his great mind upon this phase of the problem never came to him, though it cannot be doubted that, had he been able to further pursue the study, the puzzle which confronted him would have been solved.

It is perhaps not difficult to appreciate just why Miller was not able to take the next step in the solution of this puzzle. When we consider the dominating influence upon his mind of the limitations of his own definition of dental caries, a definition derived from a long, painstaking and elaborate research; and when by that research he had demonstrated conclusively that the disease could be artificially reproduced in perfect conformity with the postulates of Koch, his teacher; and furthermore, when his scientific findings were quite in accord with not only all that was known from the standpoint of clinical investigation up to that time, and was therefore in conformity with popular belief;—it would seem that, under these circumstances, nothing short of a superhuman intelligence would have entertained the thought that dental caries could be produced by any other method than that which constituted the discovery of Miller. But, notwithstanding all this, his close proximity to the discovery of a broader conception of the etiology of dental caries is indicated in connection with his comment upon his experiments on salivary fermentation, and it is interesting to note his comment thereon in which he says: "We have here a factor which should not be

altogether overlooked;" but when he goes on to say, "although *it is certainly not of sufficient importance to account for the immunity in one case and the susceptibility of the other.* I am not quite prepared to state why the saliva of one person more readily undergoes fermentation than that of another, and shall reserve a further discussion of the question for a later occasion," it seems to me that, in the light of more recent developments in connection with our understanding of the process of carbohydrate metabolism and their probable bearing upon the causation of dental caries, this last-quoted comment of Miller's takes on the similitude of the stone which was set at naught by this master-builder in dentistry and which now seems destined to become the head of the corner of our understanding of the etiology of dental caries.

It is interesting to note in passing how the thought was in his mind with regard to the influence which certain of the contained saliva salts had upon the process of fermentation, and how that possibility had been worked out and determined by the subsequent work of Dr. Percy R. Howe of Boston. It is also interesting to note, in the quotation which I have just made, Miller's recognition of the important bearing which variations in salivary composition had upon the fermentation process, and it is from my point of view remarkable that he failed to see, even when he wrote what I have just read, that it was just because of this variation in the salivary composition that he was able to note certain exceptions to what he found to be otherwise the rule—that the saliva of the caries-susceptible person is more highly fermentable and produces a larger percentage of acidity as a result of the fermentation than does the saliva of the individual who is immune to caries.

From what I have directed your attention to thus far it is probably apparent that I regard the carbohydrate content of the saliva—meaning by that its contained metabolic carbohydrate derived from the blood—as being the pabulum which is split up into lactic acid by bacterial ferments in the mouths of caries susceptibles, and it is this metabolic carbohydrate in such cases, other conditions being favorable to the localization of the process, that is the factor which determines susceptibility to caries of the teeth. This view I have repeatedly stated both in papers and in discussions, and it is a view that I had hoped would be sufficiently suggestive to induce those with more leisure than I possess to investigate it scientifically. That the suggestion has not aroused a more pronounced interest among investigators I attribute to two causes: First, that the incubus of the idea that dental caries is wholly the result of the lactic fermentation of alimentary carbohydrate food débris is so weighty and impressive, that few if any are willing to look beyond it for the broader conception that will more fully explain the unexplained things about dental caries and the phenomena of susceptibility in relation thereto. Second, that our knowledge of the conditions which lead to the presence of fermentable carbohydrate substances in the saliva is extremely meager; and I might add a third reason, and that is, that we have not yet shaken off the obsession that immunity is to be accounted for by the existence of some bactericidal factor in the saliva of the caries immune—an obsession which apparently manifests considerable vital tenacity notwithstanding the fact that the mouths of caries immunes swarm with caries-producing bacteria.

THE HYPOPHYSIS CEREBRI AND ITS RELATIONSHIP TO CARBOHYDRATE METABOLISM.

Recent studies in an apparently quite unrelated field have served to throw a most important light upon the existence of fermentable carbohydrates in the saliva, and as a consequence a corresponding illumination upon the obscure question of susceptibility to dental caries. Claude Bernard demonstrated, perhaps a half-century ago, that when the floor of the fourth ventricle between the origins of the auditory and pneumogastric nerves is punctured, in a rabbit, sugar appears

in the urine; since which time numerous observers have called attention to the glycosurias arising from disturbances in that region, particularly the region of the hypophysis cerebri; and recently Goetsch, Cushing, and Jacobson* have experimentally demonstrated the controlling relationship which the posterior lobe of the pituitary body exerts upon carbohydrate metabolism.

These observers, having first determined experimentally in dogs the limit of carbohydrate tolerance, noted a marked increase of carbohydrate tolerance after removal of the posterior lobe of the pituitary body, the increase running in some instances as high as sixty-six per cent. above the normal preoperative optimum. Following the operation the animals rapidly increased in weight by deposition of fat.

The marked increase in carbohydrate tolerance noted in the animals experimented upon by Cushing and his colleagues strongly indicates a corresponding increase in the sugar content of the blood as a result of the pituitary operation—the excess being finally stored up as fat. The normal glucose content of the blood is fairly constant at about 1 part in 1000; if it rises to 2 parts in 1000, sugar begins to make its appearance in the urine. (Starling.) Such glycosurias may be artificially produced by overfeeding upon sugars or by the injection of glucose in the circulation. If the increased carbohydrate tolerance observed after removal of or injury to the posterior lobe of the hypophysis cerebri results, among other things, in an increase of the sugar content of the blood, then we may fairly infer that sugar will make its appearance in the saliva by dialysis from the blood through the salivary glands into the mouth cavity.

The facts brought out by Cushing and his collaborators are broadly substantiated by the records of many clinical observers, all tending to show that profound disturbances of metabolism, and —what is most pertinent to our present contention—that disturbances of carbohydrate metabolism and concurrent glycosurias are associated with hypophyseal injury or disease.

Let us now consider these data in their possible dental relations.

DENTITION AND HYPOPHYSEAL IRRITATION.

It is not necessary that I should do more than recall to your minds the well-established fact that interference with the normal evolution of the teeth of both deciduous and permanent dentures results in what we are accustomed to call pathological dentition, and that pathological dentition has been shown to be the prolific cause of a long category of pathological phenomena of a reflex nervous character ranging through headaches, convulsions, chorea, epilepsy, insanity, dementia præcox, disturbances of vision and of hearing, and a host of others too numerous to mention. Such phenomena, when they are of dental origin, are examples of more or less pronounced peripheral irritation of the dental terminals of the fifth cranial nerve, which has its deep origin in the floor of the fourth ventricle. The peripheral irritation is reflected back through the origins of the trigeminus to the roots of other great nerve trunks arising in the same anatomical region, thus developing pathological manifestation at the areas of distribution of the nerve trunks secondarily affected. Because of the close regional relationship of the hypophysis cerebri to the deep origin of the trigeminus, it requires no great stretch of the imagination to realize the possible, even probable, disturbance of the pituitary body in cases of pathological dentition.

But what about normal dentition in its possible bearing upon the problem under discussion?

We are accustomed to regard dentition as simply the cutting of teeth, the passing of teeth through the gums, a process that is repeated with periodic rests or interruptions of intervening time between the appearance of each tooth or group of teeth until the normal complement is in place.

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* *Johns Hopkins Bulletin*, vol. xxii, No. 243.

While this view is in a measure correct, the more accurate conception of dentition is that it is a process of more or less continuous physiological activity extending from birth until and after the third molars have taken their normal position in the complete adult denture, at about the eighteenth year of life—a process characterized by periods of accentuated nervous stress coincident with the proruption through the overlying gum tissue of each tooth that takes its normal place in the denture. In this long period of dentitional evolution, extending through childhood and adolescence, but few individuals escape without more or less evidence of nervous reflex disturbance at times closely bordering upon the pathological, while many overstep the normal line to a serious and sometimes fatal degree. We have, then, in the dentitional process and its manifest periodic impulses of increased nervous stress, ample justification for the suspicion that hypophyseal irritation may be induced thereby, with the accompanying disturbances of carbohydrate metabolism that are now known to be the result of such irritation. The mechanism of the nutritional disturbance is in essential respects analogous to that now known to occur in pregnancy. Erdheim and Stümme,* in a study of the alterations in the hypophyses of 150 pregnant women found that in nulliparæ the average weight of the gland was 61.8 cgm., in primiparæ, 84.7 cgm., with a maximum weight of 110 cgm., while in multiparæ the average weight was 106 cgm., with a maximum of 165 cgm. After parturition a subsidence in weight of the gland occurs, involution being complete at the termination of lactation. It will be thus seen that an augmentation in the weight of the gland takes place with each succeeding pregnancy. The well-known functional disturbances of pregnancy presenting at times symptoms which Cushing describes as not unlike a transient acromegaly* are indications of pituitary disturbance; and he further says: "Pointing, too, in the same direction are the not infrequent glycosurias of pregnancy." Upon this latter point let me also quote an earlier statement of Cushing. He says:† "In a series of pregnant women observed by Reichenstein it appeared that out of ninety-three cases, 11.8 per cent. showed actual melituria, while in others a decreased carbohydrate assimilation limit, especially for levulose, was demonstrated. Indeed, a transient spontaneous levulosuria occurred in some of the cases after parturition." And he adds the following suggestive comment: "Doubtless comparable alterations in sugar tolerance occur in other periods of physiological readjustment. It is not unlikely that the glycosurias of adolescence may prove to be coupled in some way with deviations in the internal secretions which are on the border line of the physiological normal. In view of the occurence at this period of life of a rapid increment, particularly in skeletal growth, it is a natural conjecture that these glycosurias may be related as closely to a hypophyseal hyperplasia as to the more obvious changes of the interstitial cells of testis and ovary which occur at this time. But the facts already established make a sufficiently connected story to justify the avoidance of speculation."

I have endeavored to bring to your attention the significant facts that through disturbances of the hypophysis cerebri more or less profound alterations are produced in the normal metabolic processes, and that these disturbances are connected not only with disease or injury of the hypophysis but are induced by the physiological stimulus of pregnancy, and, as I am forced by the collateral evidence to believe, they are induced also by the stress of dentition. I believe also that in view of the glycosurias that are in many cases symptom-

* Erdheim u. Stümme: "Ueber die Schwangerschaftveränderung der Hypophyse," *Beiträge z. path. Anat. u. z. allg. Path.*, 1909, xlvi.

* Harvey Cushing, M.D.: "The Pituitary Body and Its Disorders," 1912, p. 243.

† Goetsch, Cushing, and Jacobson. *Bull. Johns Hopkins Hosp.* No. 243, p. 186.

atic of these disturbances, we shall find that the recorded appearance of a fermentable carbohydrate in the mouths of caries susceptibles will be found to owe its presence to the same set of causes that in similar cases account for the presence of glucose and its congeners in the urine. Indeed, if the principle laid down by Michaels is true, that the composition of the saliva gives a more accurate picture of the chemical composition of the blood from which it is derived than does the urine, we should expect to find sugar in the saliva sooner in a case of approaching glycosuria than in the urine. Given the fact that glucose is a constituent of the normal blood plasma, and that under conditions of metabolic variation not only a hyperglycemia causing glycosuria, but overflow of sugar into the saliva may occur, then we have not only another light upon the etiology of dental caries, but, what is of equal if not greater moment from a practical point of view, we have the basis for the solution of the vexed problem of susceptibility and immunity to dental caries.

DIRECTION OF THE PROGRESS OF DENTAL CARIES.

Let me direct your attention to an aspect of dental caries that has not, so far as I am aware, received the serious consideration that it deserves. The direction of progress of dental caries is from the free surface of the tooth toward its interior, until finally the pulp chamber is invaded. If we examine under the microscope a section of carious dentin cut parallel with the tubuli, we find the bacterial invasion proceeding pulpward from the dentino-enamel junction. The sectional area of the tubules nearest the enamel shows greatest enlargement and is packed with organisms, whereas that portion farthest from the enamel junction gradually tapers off until at the extreme limit of bacterial invasion the lumen of the tubule is so narrow as to contain but a single micrococcus. If dental caries is dependent upon the lactic fermentation of alimentary carbohydrate débris, how is it that the direction of advance of the bacterial invasion is away from the source of food supply rather than toward the food supply? I am aware that the diastasic action of ptyalin has been called into service in explaining this phenomenon, and that the resulting sugar is assumed to be carried to the advance guard of the invading bacterial host by osmosis. This explanation is plausible, but it does not quite satisfy; for it is a general biologic law that the localization of living organisms is primarily conditioned upon proximity of a food supply; the great migrations of the earth's fauna, and indeed, the distribution of man himself, have been determined by the source of food. When we consider the carious process in the light of this broad biologic generalization, and when, especially, we consider that the blood plasma itself in caries-susceptible individuals probably contains an amount of sugar above the physiological normal, then it seems rational to conclude that the blood plasma, or its equivalent in the juices of the dentinal fibrillæ, can furnish a sufficient amount of carbohydrate material for the nutrition of caries-producing organisms.

Referring to my quotation from Miller* in which he calls attention to the fact that "The cause of fermentation depends frequently more upon the substratum than on the micro-organism," and that "Bacteria which grow upon white of egg, producing an intensely offensive smell and strong alkaline reaction, when brought into carbohydrate exhibit entirely different phenomena, viz, acid reaction and total absence of bad smell," this observation, involving the modifying effect which the pabulum has upon the activities of certain bacteria, has been fully substantiated by the work of more recent observers.† It is

* DENTAL COSMOS, vol. xlii, p. 859: "Some Recent Contributions to the Study of the Decay of the Teeth."

† (a) "The Influence of Environment upon the Biological Processes of the Various Members of the Colon Group of Bacilli," by Ade-

well known, for example, that certain bacteria of the colon and the proteus groups will develop or thrive upon either a proteid or a carbohydrate pabulum. Thus if a peptone sodium chlorid pabulum be infected with organisms of the type under consideration, the enzyme produced under the circumstances will manifest proteolytic properties by the development of indol in the culture medium. On the other hand, if to the same pabulum be first added, say, 1 per cent. of glucose, no indol will be produced, the glucose exerting a protective action which prevents the decomposition of the proteid because of the selective quality of the carbohydrate for which the bacteria concerned show a characteristic preference. It is of interest in this connection to note that the majority of acid-producing bacteria concerned in caries of dentin will grow upon blood serum.*

The now established fact of variation in the sugar content of the blood in connection with pituitary disturbance would seem to necessarily indicate a corresponding modification in the activities of caries-producing organisms in connection with the destruction of the contents of the dentinal tubuli, and make reasonably clear why it is that the same bacteria may be responsible for the destruction of the proteid as well as of the carbohydrate material which together constitute the make-up of the tubular contents.

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laide Ward Peckham, *Journ. Exper. Medicine*, vol. ii, 1897, p. 549.

(*b*) "Modification of Method for Determination of the Production of Indol by Bacteria," by Theobald Smith, *Journ. Exper. Medicine*, vol. ii, 1897, p. 543.

(*c*) "Studies in Bacterial Metabolism." (Kendall, Day, and Walker.) *Journ. Amer. Chem. Society*, vol. xxxv, 1913, No. 9, p. 1201.

* See Goadby: "The Mycology of the Mouth," Longmans, Green & Co., 1903.

CONCLUSIONS.

If experimental investigation should determine the conditions to be as I have here outlined, then the original statement as to the etiology of dental caries made by Underwood and Milles would take on a new and important significance, for we should find as a matter of fact, as I have quoted from them in the beginning of this paper, that "The organic fibrils upon which the organisms feed and in which they multiply are the scene of the manufacture of their characteristic acids, which in turn decalcify the matrix and discolor the whole mass."

And furthermore, the question of food habit in its bearing upon susceptibility to caries will be found to involve more than an empirically balanced ratio of carbohydrates to proteids in the dietary on a calorimetric standard; it will involve also the factor of carbohydrate tolerance in determining the nutritive balance of these food principles as related to varying individual needs.

In closing this lengthy presentation, let me say that my purpose has been to put the problem of dental caries in such a position that it may be studied from a different angle of view from that which has characterized our mental attitude ever since the disease has been seriously studied at all. And I wish to lay particular stress upon the important bearing which some of the later work in relation to the physiology and pathology of the ductless glands evidently has upon the central problem of dentistry—viz, the causation of dental caries.

And, finally, I wish to record the suggestions embodied in the paper as the protocol of a research which I am now organizing in the hope of experimentally determining the truth or error of the doctrine set forth, and which I hope may ultimately help to further clarify our knowledge of dental caries.

THE USE OF BACTERIAL VACCINES IN ACUTE SEPTIC CONDITIONS OF THE ORAL CAVITY MET WITH BY THE DENTIST:

WITH

SPECIAL REFERENCE TO MANDIBULAR AND SEPTIC APICAL ABSCESSES.

With Reports of Cases.

By LEON S. MEDALIA, M.D., Boston, Mass.

(Read at the annual meeting of the New Hampshire State Dental Society, held at Weirs, N. H., June 19, 1913.)

IN this paper I shall take up for discussion the practical application of vaccine treatment in septic diseases of the oral cavity—more particularly those of the gums, teeth, and alveolar process—that are due to bacterial infection, limiting myself to those that are distinctly not chronic alveolar osteomyelitic (or "pyorrheal") in nature. The latter I have presented to you at a previous date and have published in detail since. (See DENTAL COSMOS for January and February 1913.)

The acute and chronic infections of the oral cavity in which you are interested, that are at times difficult to overcome with local measures alone, are: Suppuration of the pulp; acute and chronic septic apical abscesses; dento-alveolar abscesses, especially those of the mandibular third molar; and chronic abscess with fistula.

Such suppurative infections might arise spontaneously, as for instance during an acute attack of tonsillitis, the infection penetrating by way of the gingival margin of a partially erupted third molar, as a few of my cases will illustrate; also from neglected or decayed teeth, in which cases the infection penetrates through the pulp: or following dental mechanical procedure, such as laceration of the pulp during cavity preparation. The latter accident may be responsible for starting the condition, but it is really the bacteria and their products that are responsible for the inflammation and the suppuration.

The bacterial relation of these suppurative infections being definitely established, the vaccine treatment immediately suggested itself, especially in those cases with mandibular or apical abscesses that did not yield to the ordinary local treatment. Such cases yielded promptly to the vaccine treatment, as will be seen later under reports of cases. Some of the chronic cases with discharging fistulas that had gone on for years and in which the bone was affected were not much benefited until the indurated fistula was thoroughly curetted and the necrotic bone removed, while on the other hand those of the chronic cases where no necrotic bone was present yielded to this treatment. The chronic cases had, of course, to be followed up for a much longer time before they were cured than the acute or subacute cases.

The vaccine seemed to have been of special value in cases where the infectious process was around a partially erupted or impacted mandibular third molar. The inflammatory edema in these cases—swelling and cellulitis—was so great that it caused the locking of the jaws and the swelling of the whole side

of the face and throat. The patient could not open his mouth more than about one-half to three-quarters of an inch and was generally very sick. Local mechanical treatment was practically of no avail. The almost immediate relief of the symptoms (within eight to twenty-four hours)—the lowering of the high temperature, the reduction of the swelling and pain—following upon the administration of the vaccine was, in the beginning of this work, a surprise to both the dentist and myself.

Those of you who are doing special work in oral surgery will more particularly appreciate, probably, any therapeutic agent which will help in overcoming an infection already present in a case of fracture, or in which the infection has come on following the setting of such a fracture. In a few such cases we have used the vaccine in a prophylactic way—that is, immunizing these cases with the vaccine and thus preventing infection which might otherwise have followed.

In a similar way such prophylactic procedures might be carried out to great advantage in cases where there is a suspicion that infection might follow a given dental operation, as for instance in a run-down patient. This procedure is particularly advantageous where there are already signs of a beginning infection or symptoms of hyperemia. Under such circumstances one or two prophylactic treatments with vaccine three to five days previous to any necessary dental operation might avoid the impending infection and save considerable trouble and annoyance to the patient and dentist alike.

The best way of pointing out in just what kind of cases the vaccine has been found of value and the method of its administration would probably be by discussing the individual cases that have come under my personal observation. Before doing so, however, it might be advisable, in order to refresh your minds, to say a few words concerning bacterial vaccines, what they are made of, ways of using them, and a brief mention of the principles underlying their administration.

BACTERIAL VACCINES AND THE PRINCIPLES OF THEIR ADMINISTRATION.

Bacterial vaccines are, as you know, suspensions of killed bacteria, suspended in sterile salt solution, usually containing a small amount of disinfectant such as ¼ per cent. of carbolic acid or cresol. Since bacteria are nothing more than the lowest form of vegetable life, the vaccines, consisting of sterile salt solution having in suspension killed bacteria, are consequently nothing more than vegetable medicines. They have no animal matter in them and are not serums or antitoxins. They do not therefore, when injected subcutaneously, cause any of the serum sickness at times met with following the injection of diphtheria antitoxins. In fact, when the dosage of vaccine is properly gaged there is little more than a passing local sensitiveness at the point of injection, as much as would be caused by a slight pinch.

Method of preparation. The vaccines are prepared by planting the material obtained from the infection, or the pus, upon solid culture media—usually glucose agar. The cultures are incubated for from twenty-four to forty-eight hours—long enough for the bacteria to grow up. The bacterial growth when found uncontaminated is then washed off with sterile salt solution. This suspension is then placed in a sealed test tube, which is submerged in water kept at 60° C. for one hour. This temperature kills the bacteria without apparently destroying their immunizing properties to any great degree, if at all. The vaccine is then standardized by counting the bacteria present per ccm., or fifteen minims, and is diluted to the proper strength, the diluent being sterile salt solution containing ¼ per cent. of carbolic acid. If the cultures are found contaminated—*i.e.* contain bacteria other than those thought responsible for the condition—subcultures have to be made, and those bacteria wanted for the vaccine are isolated in a bacteriological way. The procedure after that is the same as already described.

There are two distinct kinds of vaccine in use, "autogenous" and "stock." The autogenous is prepared from bacteria obtained from the patient's own source of infection or from the patient's own pus, while stock vaccines are made up from bacteria obtained from sources other than the patient himself; *i.e.* from other patients suffering from a similar infection. The "stock" vaccine referred to in this paper consists of a large number of strains of the same organism (twenty to sixty) obtained from a variety of sources several of which are similar to those under discussion. It does not refer to the "stock" vaccine found on the market prepared by manufacturing druggists.

Method of administration. These vaccines are thin, slightly cloudy, watery fluids, are kept in bottles covered with rubber caps, and are administered subcutaneously with a hypodermic syringe previously sterilized. The dose and intervals of administration depend upon the local reaction of the patient, the particular condition treated, and the clinical response to the treatment. All these points can only be correctly determined by one who has had experience in this special branch of medicine or is specializing as an immunizer. Generally speaking, however, it may be said that the treatments are begun with the minimal dose and are repeated in acute cases as soon as the soreness in the upper arm at the point of inoculation is practically gone (usually at the end of twelve to twenty-four hours). Later, when improvement takes place, the treatments are given less often. In subacute or chronic conditions the treatments are given once every three to five days or less often.

UNDERLYING PRINCIPLES OF VACCINE TREATMENT.

The principles underlying this treatment are briefly as follows: The vaccine when administered subcutaneously stimulates the tissues of the patient, in a way unknown to us, to produce substances inimical to the live bacteria responsible for the infection. These substances circulate in the blood and affect the whole system, antagonizing the infectious process in whatever part of the body it happens to be. The protection acquired by the patient against the bacteria in this way is known as *active immunity,* because the patient takes an active part in its production. It is in contradistinction to *passive immunity,* such as protection against diphtheria acquired by the patient through the administration of antitoxin. In the latter case the child suffering from diphtheria takes no active part in the production of the protective substances. These protective substances, in the case of the antitoxin against diphtheria, are produced by the horse whose blood serum is to be used in the form of antitoxin, and not by the child or patient who is treated. A more detailed description of the principles of immunity and the method of its production will be found in a recent article of mine published in the DENTAL COSMOS for July of this year.

REPORT OF CASES.

We will now take up for discussion the individual cases that have come under my observation.

CASE I. (June 21, 1911.) B. G. W., male, age twenty-four. This patient, whom I saw at his home in consultation with his dentist, was well up to ten days previous, when he had an acute attack of tonsillitis. His physician had employed ordinary medical treatment, and he became better but not entirely well. Two days ago the right side of his throat and the gum around the mandibular third molar, which was partially impacted, got painful and swollen, preventing the opening of the mouth—he could take only liquid nourishment; he complained of considerable pain and felt sick generally. Not relieved by the usual local treatment prescribed by his dentist.

Examination showed marked swelling and an edematous condition of the whole right side of the throat, especially in the submaxillary triangle, with follicular tonsillitis and cellulitis of the front of the neck, extending upward over the maxilla and toward the orbit, the eye being slightly closed. His mouth could not be opened more than half an inch. There was no caries, nor was there pulp involvement. Was not lanced. Temp.

101°, pulse 84. Physical examination otherwise negative.

Treatment. Aside from the mechanical cleansing with dilute hydrogen dioxid and an antiseptic gargle, also attention to the bowels and diet, the treatment mainly consisted of the administration of "stock" staphylococcus aureus and pneumococcus vaccines, each made up of several strains, some of which strains were from sources similar to the one under treatment. The dose was 150 million of the former and 75 million of the latter.

Cultures taken at the same time for the preparation of an autogenous vaccine showed at the end of twenty-four hours some long chains of pneumococcus (streptococcus lanceolatus pneumoniæ) and many colonies of staphylococci.

Next day, June 22d, P.M., the swelling was markedly reduced. Felt better in every way. Temp. 100°. Could open mouth slightly more. Was given 200 million staphylococcus aureus, 100 pneumococcus, and 50 million autogenous vaccine.

June 24th. Temperature normal since the day before; swelling still further diminished; "Feeling fine." Was given 200 million staphylococcus and 50 million each of pneumococcus and autogenous vaccine.

Received treatments, of the same dosage as that of June 24th, on June 26th and 29th, July 3d, 8th, and 15th. The last three times he was well enough to come to the office. Discharged cured July 29th. Has been well since.

This case was apparently at the beginning of the suppurative stage when I first saw him. The alveolar infection was probably secondary to the throat trouble and tonsillitis. It might be well to call attention, in reference to this case, to the quickness with which the swelling and septic condition subsided and the general well-feeling of the patient by the third or fourth day after the first treatment, also the uneventful recovery without any surgical interference.

CASE II. (January 3, 1913.) G. J. B., female, student, age twenty-five, attending college away from home. Gave a history that for some time her skin would get infected from the slightest scratch, and she was very much run down generally. While home on her vacation (December 23d) she had her teeth cleaned; four days later she felt an abscess developing back of the lower right third molar; this was lanced by her dentist. Returning to Boston, she came under the care of the college dentist, who called me in. The abscess, instead of getting better, had grown more sore. The whole side of her face swelled up markedly, with considerable pain; could not open her mouth for the last four days, and had to take liquid nourishment only. Felt sick all over.

Examination revealed a partially erupted mandibular third molar, practically wholly embedded in the surrounding edematous tissue. Considerable swelling of the submaxillary triangle, edema of the whole side of the throat and tonsil, and cellulitis of that side of the neck, extending upward. Pus was present around the affected tooth, and sloughs of gum tissue were found overhanging the tooth, a condition which caused much pain on occlusion. No caries, no pulp involvement. Temp. 100°, pulse 92. Felt very weak.

Treatment. Was given 200 million staphylococcus aureus and 75 million pneumococcus stock vaccine. Cultures were obtained at the same time for the preparation of the autogenous vaccine. They showed at the end of twenty-four hours a predominating growth of penumococcus, many chains of streptococcus, and few staphylococcus.

Next day, January 4th, was given 150 million staphylococcus, 75 million pneumococcus, and 50 million autogenous vaccine. The gums looked much healthier, with very little pus present. Swelling had gone down considerably. Pulse 76, temp. 99°.

January 5th. Was given 100 million staphylococcus and 50 million each of autogenous and pneumococcus vaccine. Pulse 76, temp. 98°. Swelling practically gone. Wound looked clean.

January 11th. Came to the office for another treatment. Was given 50 million each of pneumococcus and autogenous vaccine.

January 14th. Was seen for the last time. Given 150 million staphylococcus, 75 million pneumococcus, and 50 million autogenous vaccine. Discharged cured as to local condition. Feeling fine generally. Tooth was not extracted. Has been well since.

This case distinctly needed vaccine treatment, or needed to be immunized against the pus-producing bacteria, as shown by her previous history of becoming infected from the "slightest scratch," also as shown by her lack of proper response to the regular local treatment. Her general run-down condition and low resistance to these bacteria were apparently responsible for the ease with which she became infected following the cleaning of her teeth. It is a good illus-

tration of what can be accomplished with vaccine in similar cases.

Case III. (April 1, 1913.) L. H., female, age seventeen. This patient had two ulcerated teeth some time previous. One had to be extracted. Five days previous (March 27) she felt the beginning of a toothache of her last right molar and could not take solid food. "The swelling," she said, "has been the same for the last five days and has not changed either way." She experienced no relief from the regular treatment recommended by her dentist before he referred her to me.

Examination showed marked swelling and pain of right submaxillary triangle and right side of throat, the gland being swollen, hard, and painful. Mouth could not open more than one-quarter to one-half inch. Tongue coated. Felt mean all over. Temp. 99°, pulse 100.

Treatment. Was given 75 million pneumococcus and 150 million staphylococcus aureus stock vaccine.

April 2d. Had only slight local reaction from the vaccine. Swelling gone down somewhat. Was given 100 million pneumococcus and 150 million staphylococcus aureus vaccine. Has not returned for treatment. When heard from, three days later, the swelling had subsided and the whole process cleared up. Feeling well generally. Has had no trouble with tooth since.

This case illustrates well the limitations of local treatment alone in such cases. For five days under local treatment there was no apparent change in the process, while with the vaccine treatment the condition cleared up rapidly and without reaching the suppurative stage. The possible abortive treatment of such cases when treated early enough in the disease, and without lancing, is also well illustrated here.

Case IV. (February 28, 1910.) F. N. A., female, age twenty-eight. Complained of infected lower right third molar. "Tooth itself perfectly sound." Whole right side of throat and tonsil very swollen. Considerable pain in lower jaw, with tightness and rigidity of muscles; could not open her mouth; could not masticate; had to take liquid food; hurt her to swallow. Felt bad generally.

Examination showed swelling of right submaxillary triangle, extending to right side of throat and tonsil. Submaxillary gland swollen and tender on pressure. Tongue very coated and considerable white mucus covering the gum around the lower right molars and throat. No pus.

Treatment. Vaccine administered, viz, 250 million staphylococcus aureus and 50 million pneumococcus.

March 1st. Swelling practically gone. Could open her mouth well; very little pain. Feeling fine generally. Was given another injection of vaccine in the same dose as that of the first day, and discharged. Needed no further treatment.

This case, too, is a good illustration of the possibility of aborting an acute abscess by means of vaccine during the hyperemic stage of the disease. Two treatments at an interval of thirty-six hours were apparently sufficient to check the further progress of the septic process in this case.

Case V. (March 15, 1911.) B. G. F., female, age thirty-two. Seen at her home in consultation with her dentist, who told me that she had had the lower left third molar opened into on March 9th, the pulp being found necrotic and signs of tissue necrosis present. Infection became very active immediately following the opening.

March 14th. Acute alveolar abscess, fully developed, with considerable swelling, pain, and high temperature. Her dentist advised hot fomentations and other local remedies, with no relief.

March 15th. Was seen twice by her dentist, who became very anxious about her condition. He called me in on the evening of this date, when swelling was very pronounced with evidence of beginning of third stage. Considerable swelling of the whole side of the left lower jaw with marked edema of throat and cellulitis of face and side of neck, causing difficulty in swallowing, with much local pain. Mouth could not be opened more than about half an inch. No other teeth affected. Felt very sick generally.

Treatment. March 15th. Vaccine administered in the dose of 100 million staphylococcus aureus and 50 million pneumococcus stock vaccine. Cultures taken from pus for the preparation of an autogenous vaccine showed at the end of twenty-four hours many chains of pnumococcus, a few colonies of staphylococcus aureus, and a few bacilli.

March 17th. Was given another treatment with vaccine in the dose of 75 million autogenous, 50 million pneumococcus, and 100 staphylococcus aureus. Patient stated that she felt small abscess break last night and some pus come out. Swelling and pain

greatly relieved. Mouth could be opened much better. Tooth felt better.

March 20th. Was given 50 million autogenous, 100 pneumococcus, and 150 million staphylococcus vaccine. Local condition kept improving. Felt much better generally.

March 23d. Had another treatment of 50 million autogenous and 150 million each of pneumococcus and staphylococcus vaccine. All symptoms subsided. Gums healing rapidly. Discharged.

Her dentist reported that the tooth did not have to be removed. Later a temporary filling was put in, preceded by a root-filling.

The dentist was particularly anxious concerning this case, fearing it might lead to a general cellulitis. The local and general condition of this patient was very similar, he told me, to a case he had had some time previous and which ended in a general cellulitis of the neck, taking several months and considerable surgical interference to save the patient's life. The outcome of this case under the vaccine treatment, with such slight suppuration, was particularly gratifying to him.

The following three cases—VI, VII, and VIII—are further instances of mandibular third molar abscess, and are self-explanatory. They are similar to those already described:

CASE VI. (June 1, 1911.) S. W. A., male, age twenty-four. Complained of a sore third molar and acute tonsillitis. Had difficulty in swallowing. "Caught cold in the head and chest. Raised some phlegm. Could not sleep the night before because of the tooth-pain." Could take only liquid nourishment.

Examination showed marked inflammation of the throat; swelling of left tonsil and submaxillary triangle; very tender to touch. No fluctuation; no discharge of pus seen. The acute alveolar osteomyelitic abscess in this case was apparently in the hyperemic stage. He also had acute nasopharyngitis and tonsillitis.

Treatment. Vaccine administered, viz, 200 million staphylococcus aureus and 100 million pneumococcus.

June 3d. No marked change for the better. Given 150 million staphylococcus and 100 million pneumococcus vaccine.

June 5th. "Feeling fine." Swelling gone down, and could eat well. No vaccine administered. Discharged cured.

CASE VII. (May 26, 1910.) M. C. I., age thirty-nine. Complained of abscess of tooth and gums. The tooth was filled about a year previous. Suddenly it became sore and sensitive. The filling was removed, but the trouble became worse. The gum was lanced by his dentist May 24th. No relief followed.

Examination showed marked swelling of gums around the affected tooth. Very little discharge present from lanced tooth. Cultures obtained for the preparation of autogenous vaccine showed at the end of twenty-four hours small chains of pneumococci, some staphylococci aureus, and a few long thin bacilli.

Treatment. Was given 200 million staphylococcus aureus and 50 million pneumococcus vaccine.

May 28th. Felt much improved. Swelling considerably reduced. Practically no pain. Given another injection of 500 million staphylococcus aureus and 50 million pneumococcus vaccine. Discharged cured. Did not need any further treatment.

CASE VIII. (August 1, 1910.) P. F. T., male, age forty-four. Complained of an "acute abscess of lower left molar tooth. Nerve was devitalized and tooth filled when trouble started. Did not seem to get better under local measures."

Treatment. Vaccines, 100 million pneumococcus and 150 million staphylococcus aureus administered.

August 3d. Suppuration stopped; wound healing rapidly; no pain on mastication. Was given another dose of 250 million staphylococcus and 100 million pneumococcus vaccine. Discharged cured. No further treatment was necessary.

The following are cases with septic apical and dento-alveolar abscesses of the anterior teeth. They are good illustrations of what may be accomplished with vaccine treatment in cases of acute apical abscess that do not yield readily to local treatment:

CASE IX. (June 3, 1910.) A. D. F., age fifty-three. Six days previous, while at camp on his vacation, patient felt a slight soreness of the upper left canine, which had been slightly loose. Two days later the whole side of the face swelled up. The gum was lanced by a local physician, and he felt relieved and was apparently getting well when, on June 2d, the right side began to trouble him. There was considerable swelling and pain similar to that on the left side. He came home

from camp at once. His dentist referred him to me for vaccine treatment.

Examination showed swelling of upper right gum and alveolar process, the swelling extending upward and to the left. Cellulitis of the whole side of the face, partially closing the eye. The teeth on the right side were not particularly sore. The process on the right was apparently an extension subperiosteally and within the alveolar process, from the osteomyelitis of the left side. Some pus could be squeezed out from the wound on the left gum.

Treatment. Was given 200 million staphylococcus aureus and 25 million pneumococcus vaccine.

June 6th. Swelling gone down. Feeling well generally. No local discomfort. Wound healing; no pus present. Was given 150 million staphylococcus and 100 million pneumococcus vaccine. Discharged cured.

This case illustrates the possibility of extension of the process from the left to the right side of the maxilla in spite of local surgical measures and drainage. The quick response of this case to the vaccine treatment strongly suggests the value of vaccines in such cases.

CASE X. (April 15, 1911.) S. W. E., female, age fifty-five. Saw this patient at her home, in consultation with her dentist. She complained of infected lower right canine. Had a fixed bridge put on two weeks before; soreness began three days ago. There was swelling of the gum and considerable pain. Could not sleep for the last two nights on account of pain. No fluctuation present. Local measures had apparently no effect.

Treatment. Given 250 million staphylococcus aureus and 75 million pneumococcus vaccine. "Had a good night's sleep, for the first time since trouble began," same evening.

April 17th. Swelling and pain subsided, and felt well otherwise. Given 200 million staphylococcus and 100 million pneumococcus vaccine. Discharged well. Bridge did not have to be removed.

CASE XI. (March 17, 1913.) D. S., female, age fifty. Referred to me by her dentist for vaccine treatment, this patient complained of abscess of upper right first bicuspid, which began to trouble her three days previously. Had not been lanced. Much throbbing and pain.

Examination showed gingival swelling over the tooth, with tenderness on pressure; face swollen; no fluctuation present.

Treatment. Administration of 150 million staphylococcus aureus and 100 million pneumococcus vaccine. Swelling became more pronounced the same evening, but less painful. The process came to a head, and was lanced by her dentist next day; very little pus present.

March 22d. Was given 200 million staphylococcus and 100 million pneumococcus vaccine. Gums well; wound healing; no pus. Cultures taken for the preparation of autogenous vaccine showed at the end of twenty-four hours a predominating growth of pneumococci, a few chains of streptococci, and a rare M. catarrhalis.

April 15th. Complained of some stiffness of neck ("caught cold"?) and a little soreness of the gum. Given 200 million pneumococcus and 50 million autogenous vaccine.

April 19th. Was given 150 million pneumococcus and 25 million autogenous vaccine. Local treatment was kept up by her dentist, who gave me the following report:

"This patient consulted me November 15, 1912, with reference to placing a gold crown on the upper right first bicuspid, the same root having been treated and filled by an able dentist in Washington two years previously. There were present all the indications that the root and surrounding tissue had been in normal healthy condition. The root-canal filling was therefore not removed, because of the history of the previous care in this case. The root was crowned and remained comfortable for four months, when an acute alveolar abscess suddenly and without warning developed, with considerable swelling. It was lanced; but little pus was obtained. It then assumed the chronic apical abscess form, with fistulous opening. It was treated at intervals locally and by vaccine until June 3d. At the last treatment, on that date, there was found on probing a slight necrosis of bone, which was curetted, and a wick was left in for twenty-four hours. No further trouble since. At no time was the root itself loose. Whether the condition is definitely cured is questionable."

This case illustrates the fact that vaccine cannot be expected to remove local mechanical irritants, be they necrotic bone, a too long pin, or filling material that has been pushed through the root-canal. I believe, however, with the dentist, that the vaccine has helped the inflammatory and suppurative conditions in this case.

CASE XII. (January 14, 1913.) L. A. T., female, age forty-eight. Had had ulcerated teeth previously, which had been removed. Complained now (January 14th) of an ulcerated tooth the pulp of which was devitalized and filled about a year ago. The trouble began suddenly; had the filling removed, the tooth cleaned, and temporary filling put in; no relief. Had the temporary filling removed a week ago. "Trouble started up worse than ever," when she was referred by her dentist for vaccine treatment. Not much swelling, but throbbing pain, particularly bad at night. Could not lie on that side. The X ray showed a circumscribed abscess around the root of upper right lateral.

Treatment. Was given 150 million staphylococcus aureus and 100 million pneumococcus vaccine.

January 16th. The tooth felt much better. Was given 125 million staphylococcus and 75 pneumococcus vaccine.

January 18th. The gum had been lanced by her dentist the day before; no pus was found. Cultures taken from the lanced wound showed chains of streptococci and pneumococci. The tooth was progressively better. The same day, January 18th, she was given 50 million staphylococcus and 100 million pneumococcus vaccine.

January 23d. Was given 50 million staphylococcus, 100 million pneumococcus, and 25 million autogenous vaccine.

January 30th. Was given 75 million staphylococcus, 100 million pneumococcus, and 50 million autogenous vaccine. The tooth felt well. Was advised to wait for permanent filling.

March 15th. Has been well since last treatment. Was sent in by her dentist for a prophylactic treatment before he attempted a permanent filling. Was given 100 million staphylococcus, 125 million pneumococcus, and 50 million autogenous vaccine. The tooth was filled permanently. No further trouble.

The following two cases are illustrative of chronic apical abscesses with discharging fistula and necrosis of the alveolar process:

CASE XIII. (August 3, 1909.) J. T. V., male, age fifty-six. Suffering with cellulitis of upper lip and right side of face. "Started last Friday with soreness of upper lateral incisor." Complained also of shooting pains in the neck and shoulder for the last two years (neuralgic pains?). The tooth had been troubling him for two years. Had had the filling removed, and the gum lanced; no relief. Referred by his dentist for vaccine treatment.

Treatment. Was given 500 million staphylococcus and 50 million pneumococcus vaccine.

August 5th. Was given 800 million staphylococcus and 50 million pneumococcus vaccine.

August 16th. Cellulitis gone; still felt soreness of gum. Kept up treatment on an average once every four to six days until December (*i.e.* for four months), mostly for relief of his neuralgic pains rather than the tooth. Neuralgic pains lessened and general condition improved, but still conscious of tooth. Had a radical operation performed by his dentist; infectious material and necrotic bone removed. Kept up vaccine treatment to June 2d, on an average once every eight to fourteen days, with the idea of preventing further development of tooth trouble. The wound healed and the tooth has felt well since.

CASE XIV. (January 31, 1913.) C. I., female, age thirty-two. Complained of tooth abscess of two years' duration. Trouble began following the introduction of a crown and pivot in the root. A year ago the abscess was opened and a new pivot and crown were put in while the abscess was still discharging pus from a fistulous opening, which kept discharging, off and on, all the time up to a few weeks ago, when there was an acute exacerbation with swelling of the whole side of the face, with considerable pain. Was very sick generally. Had it curetted by her dentist about a week ago; has been draining since; is still discharging considerable pus.

Examination showed swelling of the gum over the tooth, with deep fistulous opening. A few drops of pus could be squeezed out. Bare bone was felt with a probe. Cultures obtained from the pus for the preparation of autogenous vaccine showed principally pneumococci, a few chains of streptococci, and a rare weak staphylococcus aureus.

Treatment. Was given 75 million autogenous and 25 million pneumococcus vaccine. Vaccine administrations repeated on an average of two to four days in similar doses up to March 3d. Considerable improvement in discharge of pus and soreness of tooth, but was not cured of the condition. Was advised to have a radical operation done. Has not been seen since.

Both of the above cases are cited to indicate the limitation of vaccine treatment, and to again emphasize that we cannot expect the vaccine to substitute

proper surgical attention. Where an indurated fistula and bare necrotic bone are present, these have to be removed by a radical operation and curetting of the fistulous tract before this or any other treatment can be of any avail.

SUMMARY.

The cases of mandibular abscess cited, especially those accompanying a partially erupted third molar, are particularly instructive. They indicate what might be accomplished with vaccines in similar acute infections. According to the best text-books on dental pathology and therapeutics, such cases are the worst ones met with in dental practice. Local surgical treatment is practically impossible in such cases, on account of the rigidity of the muscles and the locking of the jaws. The condition is therefore left to nature to do its best, or worst, depending upon the virulence of the bacteria and the general condition of the patient, who has to fight his own battle practically unaided. The vaccine treatment, which tends to raise the resistance against the invading bacteria, is apparently the only direct help we can give the patient under the circumstances.

The cases here recorded are probably the very worst ones met with by dentists. Practically never have I had a case referred to me unless the dentist was fairly satisfied that he could do little for the patient by local measures alone, or after such local treatment had been given a fair trial and failed. The results obtained are therefore more valuable.

The records of *all* the cases that came under my observation have been cited in detail, in order that everyone may be able to judge for himself and draw his own conclusions therefrom.

The two chronic cases with fistulas were cited principally to call attention to the limitations of this treatment and also to indicate that vaccines should not be expected to substitute local surgical measures when these are necessary.

CONCLUSIONS.

The number of cases are too few from which to draw definite conclusions. I should like, however, to emphasize the following points:

(1) Vaccine treatment seems to be of value in acute septic dento-alveolar abscesses. Even the worst types of mandibular impacted third molars have apparently yielded well to this treatment.

(2) Such cases with septic apical abscesses, especially the deep-seated ones or the so-called blind abscesses, acute and subacute, have been greatly benefited by the vaccine method of treatment.

(3) I believe that there is a big field for vaccine treatment in acute and subacute dento-alveolar abscess cases, and its widespread employment will save considerable suffering and loss of teeth to the patient and annoyance to the dentist.

In concluding, I wish to thank those members of the dental profession who have referred the cases to me, so making this study possible. I am particularly grateful to Dr. F. S. Belyea of Brookline and Dr. Wm. Y. Allen of Boston, who have so kindly put most of these cases at my disposal and have rendered valuable assistance in following them up.

THE APPLICATION IN PRACTICE OF WHAT IS KNOWN CONCERNING THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE DENTAL PULP.

By H. B. TILESTON, D.D.S., Louisville, Ky.

(Read before Section III of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

WHEN it was suggested to me by the chairman of this section that I write a paper on the diagnosis and treatment of the diseases of the dental pulp, I was disposed to decline, for the reason that there appeared to be no justification for treating once more a subject which has had such classic treatment at the hands of scientific writers such as Prinz, Buckley, Black, Burchard and Inglis, Louis Jack, and others.

It would seem that such a vast fund of knowledge, organized, as it has been, into approximately a positive science, could need no further amplification at the hands of a modest practitioner who lays no claim to scientific attainments as an original investigator.

THE ATTITUDE OF DENTAL STUDENTS AND PRACTITIONERS TOWARD SCIENTIFIC THEORY.

It occurred to me, however, that after all the average dental practitioner is not unlike the college student in many respects. My observation as a teacher has been that students generally are apt to look upon the instruction given them from the rostrum as something quite apart from their practice in the clinic, and that, in their opinion, the so-called theoretical subjects propounded by the lecturer, while admittedly scientific, are only theory after all, and are too abstruse to be intelligently applied in practice.

Such, I apprehend, is the attitude of mind with which a large number of practitioners view the writings of scientific investigators upon the symptomatology and morbid anatomy of the pulp in their relation to the treatment of diseases of that organ. If they read such essays at all, it is with a sense of remoteness, a feeling that it is interesting if true, but that, even if true, it has no immediate bearing upon actual practice in dealing with aching teeth. It is much like reading an account of a battle in the Turko-Bulgarian war—it is too far off to touch them intimately.

Far be it from me to discredit the average intelligence of the average dentist. But we are all human and subject to human weaknesses, one of which is the tendency to take the easiest way and not to be hindered in our empirical practices by the restraints imposed by too deep a scientific comprehension of the whys and wherefores. If we get results—whether right, partially right, or totally wrong—and are satisfied, why not be happy?

Nor would I impugn the understanding of those who listen to the reading of this paper, many of whom are better informed upon this subject than I am; but this is not the audience to which this paper is primarily and ultimately addressed.

In view of these facts it occurred to me that a paper devoted to the discussion of the application in actual practice in treating diseases of the dental pulp, of what is known and published concerning its pathology, might prove both timely and instructive—hence the title of this

paper. In dealing with this subject it is my purpose to be as direct, simple, and plain as it is possible to be, so that language and conclusion may be clearly understood.

THE IMPORTANCE OF THE DENTAL PULP.

In the first place, there is noted a tendency on the part of many practitioners to place too light an estimate upon the value of a pulp to a matured tooth. It is doubtless quite generally recognized and conceded that it is a misfortune for a tooth to lose its pulp before the completion of its outer form. But it has been taught by some eminent authorities that from that time the pulp begins to degenerate.

It is true that the pulp continually decreases in size as the dentinal walls thicken, at the expense of that organ; but may not that process also be properly considered as a normal function of the tooth pulp rather than a degeneration?—for in the normal course of events it never entirely disappears, though it may be reduced to a mere thread. Even the teeth of very old people are found still to be vital. The tendency toward ruthless destruction of tooth pulps, which is far too general, can only be accounted for by the recognition of a general conviction that a pulpless tooth is as good as a vital one.

The devitalization of pulps is even resorted to by some as a "treatment" for hypersensitive dentin—a condition which does not necessarily mean that the pulp is diseased, and which, by intelligent treatment, may be controlled so that the filled tooth is made perfectly comfortable.

No better evidence of the value of the vital pulp to a tooth should be needed than the observation that the moment the pulp is removed, the tissues of that tooth begin to degenerate. It shortly becomes opaque, frequently discolors, sometimes very badly, it becomes more brittle, and the enamel in time readily flakes off from the dentin. It may not be more vulnerable than a vital tooth to the initial attack of caries, but when once caries is established, it runs a more riotous course. While such a tooth may be retained for many years, eventually the gum begins to recede from about its neck, the pericementum also shrinks, and the blackened roots stand exposed. Eventually the tooth becomes an irritant and nature casts it off. And all this while its vital neighbor still stands in all its pristine beauty and firmness.

The destruction of a tooth pulp would not be so bad, if one could always be sure that that ended it. But it quite frequently happens that the ghost of the dead pulp refuses to down, and continually rises up to plague us with the various ills that follow as sequels to the operation. The devitalization of the pulp may set up irritation beyond the apex of the root; the pulp may be imperfectly extirpated, or the roots not thoroughly filled, any or all of which may give future trouble, and these possibilities, these liabilities, should give us pause ere we venture to unnecessarily destroy the pulp of a tooth.

DECIDING WHEN A PULP CAN BE SAFELY PRESERVED.

Of course it is not possible to conserve all pulps, nor is it advisable in some cases even to attempt to do it. In general practice the dentist encounters pulps in all stages of involvement, and it is often a point of nice discrimination to decide just when it is possible to save the pulp. A history of discomfort or even of pain in a tooth now and then, brought on by extremes of temperature or contact with sweets or acids, need not mean any grave involvement of the pulp itself. The teeth of some persons are so sensitively alert to any encroachment upon the dentin, that the slightest cavity is discovered by the patients themselves and accurately located before the dentist finds it in the usual way. In the majority of such cases the cavity may be safely excavated and filled at once, without fear of future discomfort.

If the dentin is quite sensitive, the cavity should be treated with phenol before inserting a metallic filling, which will have a tendency to modify painful shocks from temperature changes. Such

medication is contrary to the dictum of Dr. Black, who says that, after a cavity has been prepared for filling, neither saliva nor any drug should come into contact with it. But hundreds of the older practitioners have long been in the habit of using phenol or wood creasote in cavities just previous to inserting a gold filling, and their operations compare favorably with any others as to permanence.

When a tooth that has had a metallic filling placed in it is found painfully sensitive to extremes of temperature, but immediately becomes comfortable when the temperature returns to normal, the fact need not cause any anxiety as to the condition of the pulp. In a very large majority of instances such slight shocks act as stimulants to the pulp, inducing a physiological activity of the odontoblastic cells, which proceed to deposit a layer of secondary dentin between the pulp and the filling; and on this act of protection being completed, the tooth is no longer sensitive to thermal changes.

ACTIVE HYPEREMIA.

The condition of temporary sensitivity referred to is often confounded with active hyperemia—a more serious condition, since it is a disease of the pulp itself.

While the afore-mentioned thermal sensitivity of a recently filled tooth simulates to some extent the latter condition, there is this distinctive difference—that, in active hyperemia, the pain is induced by temperatures much farther within the normal temperature range, and does not immediately subside when the temperature returns to normal. It is to be noted, however, that the pain does pass away in a short time, and the tooth remains quite comfortable until again disturbed by thermal shock—which differentiates active hyperemia from other more serious affections.

It should be observed just here, also, that in all diseases of the pulp, except when the pericementum is involved, the pain is more apt than otherwise to be reflex, and hence it frequently calls for a careful application of diagnostic tests to locate the real seat of pain.

In the absence of a particular tooth as manifestly the cause of the trouble, such as one with a large open cavity, or one with a large filling in it, it may be necessary to isolate each tooth with the rubber dam and apply to each the thermal test.

Having established the diagnosis of active hyperemia and located the offending tooth, the treatment to be followed is to remove the local cause and give the pulp what has frequently been called "physiological rest," which means that it must be placed in such condition that it can functionate normally, when the odontoblasts will deposit secondary dentin to protect it, as stated above, after which it returns to health.

If a carious cavity be present, it should be cleaned of all decayed matter and dressed with carbol-eugenol, phenol and oil of cloves, Buckley's phenol compound, or some such soothing and antiseptic drugs, and the cavity sealed with a non-conducting material. If a metallic filling is the cause, it should be removed, and a non-conducting filling substituted. As an aid to the depletion of the pulp of the excess of arterial blood, counter-irritation may be resorted to, such as painting the gum over the tooth and for some distance about it with Buckley's refrigerant, or the use of a capsicum plaster.

The prognosis in active hyperemia is usually favorable. When the diagnosis has been definitely made out, devitalization is inexcusable.

PASSIVE HYPEREMIA.

In his classification of diseases of the dental pulp, Prinz does not mention passive hyperemia. Even if it be admitted, as it quite generally is now, that inflammation can occur without bacterial invasion of the part, there is still ample evidence, clinically, that such a condition as passive or venous hyperemia exists separately and distinctly from pulpitis.

Congestion of the pulp is a serious

condition, and if stasis does not occur through strangulation of the bloodvessels at the apex of the root-canal, the pulp will generally have to be devitalized, for the prognosis is unfavorable, although occasionally a pulp that has been the seat of venous congestion will recover and remain alive and comfortable for many years.

The only reason why great care should be exercised in the differential diagnosis of active and passive hyperemia is that a pulp in the first condition may not be needlessly sacrificed, through thinking it to be in the second!

There are several definite points of difference in the symptoms of these two forms of hyperemia, relating chiefly to the character and duration of the pain. The anamnesis or past history should be carefully inquired into, when, if it be a case of passive hyperemia, the following facts will be brought out:

The tooth has ached intermittently for some time. At first the pain was brought on by contact with ice-water or cold air, but soon subsided when normal warmth returned. (The case at that time was one of active hyperemia, which always precedes the passive.) Later the pain would start when the tooth was exposed to either heat or cold, and was accompanied by a feeling of fulness; the pain was of a throbbing character, and when once started continued for hours and refused to be comforted by sedatives of any kind, but finally the tooth would cease aching, and would remain comfortable until again aroused by another shock. If the pulp is exposed and can be seen, it shows a dark color, like venous blood, instead of the bright pink of arterial blood. If these points can be clearly established, passive hyperemia is definitely diagnosed.

If the case is seen during a period of quiescence, and the cavity be carefully cleared of all foreign matter and soft caries and dressed with a soothing antiseptic sealed without pressure, it may be that the pulp will resume a normal condition and can be preserved. This procedure should be followed in any case, for it is imperative to first soothe a congested pulp, and to keep it quiet for a day or so, before attempting to destroy it with either arsenic or cocain; otherwise the application of either drug will aggravate the pain without accomplishing the devitalization of the pulp.

PULPITIS.

Inflammation of the pulp, or pulpitis, is a far more serious affection than either form of hyperemia, because of the difficulty in treating it successfully and the great amount of suffering it entails. There is probably no other pain comparable in its severity to that of an inflamed pulp when there is no point of exposure, especially if accompanied by suppuration.

All the descriptive adjectives such as boring, throbbing, fulgurating, lancinating, diffused, and jumping, may be applied to the character of pain from an inflamed pulp in the acute form. It may be shifting as to location, at times reflected to the ear, then to the region of the eye, or again, centering in the guilty tooth; or it may be diffused over the entire distribution of the trigeminus at once. It is intermittent as to its severity, but never entirely ceases—a point which is pathognomonic of acute inflammation, distinguishing it from hyperemia.

The fact, also, that the pain increases upon lying down is distinctive of inflammation, as well as the fact that heat intensifies the pain, while cold has a tendency to lessen it. These latter phenomena, however, are true also in some forms of pulp degeneration. The migration of white blood corpuscles into the connective tissue of the pulp, while conclusive in its diagnostic value, is a post-mortem test, hence not applicable to ante-mortem conditions with which we are dealing.

The symptoms accompanying acute inflammation of the pulp are so pronounced that there should be no difficulty in diagnosing that condition. Relief is much more difficult to secure. Many a valuable tooth has been extracted in desperation under such circumstances, the loss of which has been a lifelong regret.

Where there is no open cavity present,

the quickest method of relief is to administer a general anesthetic and drill into the pulp, remove at least the bulbous portion, place a soothing medicament, and seal the cavity. If a carious cavity is present deep enough to reach the pulp, the carious matter should be carefully removed, until the pulp is exposed, which can then be punctured. After the engorgement has been relieved through the hemorrhage, a soothing medicament will be effective, but not before. At a subsequent sitting the pulp is to be devitalized and later removed.

Chronic pulpitis is a low form of inflammation indicative of advanced degeneration, and, when the pulp is exposed, is apt to be accompanied by hypertrophy. Usually there is not much acute pain in chronic pulpitis unless the pulp is subjected to pressure through an open cavity, but there is a constant sensation of uneasiness in the tooth, which is sometimes not inaptly called a "grumbler."

With the ultimate purpose of destroying it, the pulp must first be depleted of its excess of blood, and if there is fungous pulp tissue, it should be excised, which will cause sufficient hemorrhage to deplete the body of the pulp, after which an arsenical application will be effective.

PURULENT PULPITIS.

When a pulp becomes infected with pyogenic organisms, suppuration occurs either in an acute form, pulp abscess, or as the chronic ulceration. It is often difficult to account for the presence of pus germs within a pulp chamber which has no direct opening leading into the mouth, yet we have all demonstrated the presence of pus by opening into a pulp chamber through solid dentin or an impervious filling. Pus thus inclosed within the pulp chamber is diagnosed by the intense throbbing and boring pain, due to not only the pressure upon the nerve elements of the excess of blood accompanying inflammation, but that due to the increasing production of pus. Heat greatly increases the pain; an application of cold relieves it partially, but not completely. The tooth responds painfully, to some extent, to percussion. No attempts at sedation are in any degree successful until the pus has been released by puncturing the abscess, which, as mentioned above, may involve drilling through the tooth tissues or through a filling. In doing this, overheating of the drill must be avoided by having an assistant direct a stream of cold water upon it, and thus save the patient unnecessary pain. When the drill first enters the pulp, and pus follows its withdrawal, the sudden relief from pressure often causes a throbbing of the arteries of the pulp, and an almost unbearable exacerbation of pain, which, however, gradually grows less, after which the pulp can be soothed into comfort.

Ulceration of the pulp is not painful, because it occurs upon an exposed surface, hence the pus flows away without creating pressure. If the continual escape of the pus is obstructed by impacted food or an unwise attempt to stop up the cavity, the case becomes one of abscess with all the distressing features of that condition.

Before attempting the destruction of a suppurating pulp by any method, it is essential that the pus sac or ulcerating membrane be completely destroyed, and the inflammation controlled. If that be not done, even though the pulp might tolerate being sealed up, the exudate, composed of a small amount of pus or of serous fluid from the inflamed pulp tissue, will hold the arsenical application away from contact with the pulp elements, and the devitalizing agent will have no effect whatever.

Cocain anesthesia is out of the question in such a case, because the pulp will not tolerate the necessary pressure. Moreover, pressure anesthesia is unwise in the presence of pus infection, because of the liability of forcing bacteria into the tissues beyond the root-apex, causing acute alveolar abscess. The pus-forming membrane should be destroyed by the use of pure phenol or phenol-sulfonic or trichloracetic acid, after which the usual procedures may be followed.

PULP NODULES.

Burchard classifies the formation of pulp stones or nodules as a constructive disease of the pulp, but it is eminently destructive in its effects. These calcic masses within the pulp tissue are not due to any excessive activity of cells whose normal function is to build the hard tissues of the tooth, but are an agglomeration of calcific material, held in solution in the pulp, about centers or nuclei; the cause of their formation is not known.

While there are some symptoms which lead to an inferential diagnosis of the presence of pulp nodules, such as reflex neuralgia along the distribution of the fifth nerve, especially about the ear, or over the eye, sometimes fulgurating back to the tooth itself, excessive sensitiveness of the tooth to cold, and hypersensitivity of the dentin, the only positive diagnosis is to be made by the use of the X rays, or by the demonstration of their presence by actually finding them.

Owing to the mechanical obstruction of pulp nodules in the pulp chamber and canals, it is difficult to destroy such a pulp and to remove it successfully after it is destroyed. Circumstances may be such that it is best to extract the tooth in order to relieve the sufferings of a patient. As pulp nodules occur frequently in teeth not affected by caries, it may be necessary to drill from the surface to the pulp chamber before anything can be done toward alleviation of pain, which is not always possible unless done under a general anesthetic, which may not be advisable either.

On one occasion I was called into consultation with a physician at the bedside of a patient who was suffering from a neuralgia of obscure origin. I suspected the presence of pulp stones, and by means of the thermal test and percussion I traced the source of the neuralgia to a molar, extracted it, broke it open and found the nodules *in situ*. The patient was relieved at once of suffering which had extended over a long period.

If the pulp can be exposed, repeated applications of arsenic may be required to devitalize it, and after the canals are finally filled, such teeth may develop a persistent non-septic pericementitis from which they never recover.

DEEP CAVITIES INVOLVING THE PULP.

In cases of deep cavities, when the pulp is not actually exposed but when there is reason to believe that it is more or less involved, it often becomes a nice point in diagnosis to determine whether a filling may be safely placed over such a pulp, or whether it requires preliminary treatment, or whether or not it had best be destroyed. In deciding these questions, there are two important factors to be taken into account.

First. The history of the tooth, gathered from the patient by these questions, viz: Has this tooth ever ached? If so, what appeared to be the initial cause? Does it begin from contact with anything cold? Do sweets or acid-sweets (candy) cause it? Does it become painful when food becomes packed into it while eating? How long does it ache when started, and what was done to relieve it?

If the fact is brought out that the tooth only hurts a little while, when in contact with cold considerably below normal body temperature, such as ice-water or ice-cream, or is briefly painful to things sweet, and comfortable at other times, no serious lesion of the pulp need be apprehended. If, however, the tooth aches when food becomes crowded into the cavity in eating, and is only relieved when the food is picked out of it, it may mean either that the pulp is suppurating and voiding pus into the cavity, which being obstructed in its escape produces pressure and pain, or that it is putrescent, and the usual escape of gases is prevented; or it may indicate that the covering of the dentin over the organ is so thin that the pressure of the food is conveyed to the pulp, which is very intolerant of pressure.

Second. If through these questions it is determined that as yet there is no serious disease of the pulp to be dealt with, the second item of importance is to determine the character or the condition of the dentin lying immediately over the pulp.

Now we know that, in the progress of dental caries, the lactic acid operates in advance of the bacteria that produce it, dissolving out the calcium salts of the dentin. The dentin so acted upon is said to be *affected*. When the germs have advanced into this decalcified area, the dentin is said to be *infected*.

In determining the best procedure in these deep cavities, it is quite important to distinguish between affected and infected dentin, and nice discrimination is called for to do it. The decision is made through the use of the senses of sight, touch, and hearing. With a broad-bladed spoon excavator, all soft carious matter is gently lifted away, until the dentin beneath feels harder than the matter just removed; it gives forth a different sound as the blade passes over it, and when viewed with a strong light the surface shows smooth, and not penetrated at some point by a depression filled with a softer material. Such a point is to be viewed with suspicion, for it is the end of the cone of decay which very probably penetrates to the pulp, and we have an exposure there. The dentin over the pulp will always be dark in color, but if firm, smooth, and unbroken by any of those penetrating points, it may be anticipated with considerable confidence that this layer, if properly protected, will become recalcified and the pulp be preserved in comfort. It is well in such cases to take the precaution to sterilize the dentin by sealing some mild antiseptic into the cavity for several days.

If in the removal of the carious matter the pulp is exposed, it may be presumed to have been infected to such an extent as to make the propriety of capping it doubtful. Completely decalcified dentin loaded with bacteria, lying for some time directly in contact with a pulp, will have reduced the vitality of that organ through the absorption of toxins to such an extent that, if it be capped, death will probably supervene in time.

The death of pulps occurring under cement fillings or floors in deep cavities, which has been attributed to the action of arsenic contained in the cement as an impurity, is much more likely to have been brought about, as has been pointed out by Dr. C. N. Johnson, by the leaving of disorganized dentin in contact with the pulp.

ACCIDENTAL EXPOSURE OF THE PULP.

When a healthy pulp is accidentally exposed in extending a cavity into sound dentin, conditions are very different from those that obtain when a pulp is invaded by caries. In the former case the point of exposure is usually very small, being indicated to the eye by a tiny red or pink spot or a drop of blood. If this spot be immediately touched with phenol, and covered with an antiseptic paste made by mixing thymolized calcium phosphate with Buckley's phenol compound, this to be covered with cement without pressure, the pulp will usually be none the worse.

An experienced operator knows instantly when he has touched the pulp in excavating a cavity, by the peculiar start the patient gives, which is different from the usual manifestations of pain when sensitive dentin is being cut, and when an operator receives that electric message, he should at once stop and look for that little red spot and take care of it then and there.

PERSISTENT HYPERSENSITIVENESS.

It sometimes happens that, when a large metallic filling or a gold inlay has been placed in a deep cavity in a vital tooth, extreme sensitiveness to slight reductions in temperature supervenes after some time, and this persists in spite of such treatment as is possible under the circumstances, and grows continually worse until that side of the mouth is rendered practically useless. It is difficult to say sometimes just what the cause may be, for it remained comfortable for a year or perhaps longer after it was filled. The trouble may be due to an active hyperemia induced by some severe shock from contact of the filling with some very cold substance, or possibly is the final outcome of imperfect excavation of carious dentin over the pulp. At any rate, whatever the cause, the discomfort is so great that something must be done to relieve the condition.

Unless the patient be too young to make it advisable to destroy the pulp, the procedure to obtain the quickest relief is as follows: With a small sharp drill, a hole is made in the side of the tooth—generally a molar—near the neck at the point of nearest approach to the pulp. The dentin will be sensitive when the drill first enters, then for a little distance there will be no pain; then, as the pulp is approached, it begins to hurt again. The operator must stop at this point, before the pulp is penetrated. Some of Buckley's arsenical paste is mixed with wood creasote to make it more liquid, and, taking up the tiniest possible quantity on a bit of cotton, carried to the bottom of the drill hole and sealed with cement. There will be no pain superinduced by the arsenic, and in twenty-four hours the tooth will be no longer sensitive to cold. In a week's time or longer, if more convenient, the pulp chamber may be entered from the occlusal surface, the pulp removed, and the canals and both openings filled.

This means the loss of the pulp, it is true, but the relief and comfort that comes from being able again to use teeth that have long been out of commission is, as I know from personal experience, worth the sacrifice. Moreover, if destroying the pulp is postponed in the hope, generally vain, that it will return to normal condition, the continued irritation is apt to induce the formation of pulp nodules, which will complicate the management of the case when the pulp finally has to be destroyed.

A PLEA FOR THE PRESERVATION OF PULPS.

While it is plainly evident from what I have said in the foregoing pages, that there are frequent occasions, in dealing with diseased conditions of the dental pulp, when it is good practice to destroy and remove it, I want to enter an urgent plea for the preservation of that organ whenever there is a fair chance that it may be continued in health and comfort, and to record my conviction that there is too great a tendency, among an increasing number of dentists, to destroy pulps for trivial causes. This tendency shows a deplorable lack of appreciation of the real value to a tooth of its center of vitality—its pulp.

With a little more intimate knowledge of the symptomatology of the pulp in its various states, and a little more patience and perseverance in treating them, many pulps could be preserved in comfort and usefulness which are now being thoughtlessly destroyed.

The destruction of the pulps of all teeth upon which a gold crown is to be placed, as has been advocated by many crown and bridge workers, is not necessary—I mean in all cases.

When a tooth is so shaped or is inclined in such a position that much cutting is required to fit a band to it properly, the patient may be saved considerable pain in its preparation, and the tooth will be more comfortable afterward, if the pulp be removed.

But there are many molars and bicuspids upon which shell crowns can be placed with but little preparation, and there is no reason for destroying their pulps just because a crown is to cover them.

The advent of the gold inlay has had the happy effect of reducing largely the number of abominable gold crowns used, and one of the reasons why the inlay has proved a positive blessing is that those who use inlays are generally willing to spare the dental pulps.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

SCIENTIFIC MANAGEMENT APPLIED TO DENTAL PRACTICE.

By EDWIN N. KENT, D.M.D., Brookline, Mass.

(Read before the Northeastern Dental Association, at its annual meeting, at Hartford, Connecticut, October 15, 1913.)

DURING the past two years the sensitive natures of some of our professional brethren, whose enthusiasm on the subject of ethics has carried them beyond the bounds of reason, must have been shocked by the repeated claims of essayists that the practice of dentistry is a business.

THE DENTIST'S DUTY OF BUSINESSLIKE CONDUCT.

Noah Webster made the statement some years ago in his great publication that business is "any particular occupation or employment engaged in for livelihood or gain, as agriculture, trade, art or profession"—and Mr. Webster had the reputation of having a fairly good knowledge of the meaning of English words. A man who practices dentistry is engaged in business, whether he likes it or not.

This is a convention of business men. Of what significance is this fact?

Simply this: Each member of this organization, being a business man, being thus subject to the laws, rules, and customs of business life, cannot do his full ethical duty to the commercial world, his country, his community, or his family, unless he makes a reasonable effort to conduct himself and his institution in accordance with such commercial standards as are accepted and adopted by other honorable business men. The dentist who conducts his business in a haphazard, hit-or-miss manner is a positive injury to the community in which he lives. He is not a good citizen, and it is more important to be a good citizen than a good dentist.

The consideration of the business side of dentistry is an ethical duty rather than an ethical breach, and somewhere on the program at every dental society meeting it should have its place.

SHORTCOMINGS OF PREVIOUS ESSAYS ON THE BUSINESS SIDE OF DENTISTRY.

Notwithstanding the fact, however, that essayists of the past two years have given the business side of dentistry considerable attention, they have for some strange reason confined their discussions to one or two phases of the subject. They have told us "How to Extend the Field," as they term it, and how to reckon, by a more or less elaborate system of figuring, the proper remuneration which should flow hourly into the lockers of the man who has spent three years of time and several thousands of dollars in acquiring the privilege of establishing himself in dental practice.

These topics are both interesting and necessary in the building-up of business, but it seems strange to the writer that the one great theme of absorbing interest to business men in every department of trade, from the small retail store to the big factory, is never touched upon.

SCIENTIFIC MANAGEMENT IN INDUSTRY.

Scientific management is the keynote of modern industrial progress. It has been declared by enthusiasts to have effected the greatest advance in industry since the introduction of machinery.

Scientific management, however, does not necessarily involve so deep a study as its name would imply. It is, in fact,

little more than the application of "common sense" in the arrangement of the details of industrial life. Business men who have adopted its reforms have not learned points they did not know before, concerning the relative efficiency of individual laboring men, for instance, but they have learned to apply the knowledge they have always possessed, in making such selection and division of labor as will insure the right man doing the right work under the right conditions at the right time, thus facilitating maximum production at minimum expense.

In its regulation of the general management of manufacturing institutions, it eliminates leakages, or time and money waste, and finally, betters the quality as well as the quantity of the product. There is no part of the modern business institution that is not subject to its reforms, from the office to the shipping-room, and no person, from the president in his private office to the coal-passer in the boiler-room, can escape the rules which are being adopted and stringently applied in an endeavor to increase industrial efficiency.

As an example of the extent to which the system is applied in modern shop practice, a certain workman is selected for a specific class of bench work, after extensive eliminative tests of groups, such tests covering a wide variety of psychological and physiological experiments and records which determine his fitness for the work in question.

It is determined by exact laboratory tests just how high his chair should be, to render his attitude most favorable to meet the physical strain incidental to the particular class of work in which he is engaged, the same proportionate care being given to the layout of the bench and other furnishings. The proper direction and intensity of light is carefully considered. Tools are permanently arranged in such a manner that they will come easy to hand, so to speak. The hammer, as an example, fits a receptacle which assures a position where it is easily and naturally grasped by the hand, without the necessity of a further shifting movement, when the arm is extended just an easy distance, in the most natural direction. Certain types of work are picked for the particular time of day when the psycho-physical condition of the operator is found by experiment to be most favorable, and different types of operations are alternated in a manner found favorable to the conservation of muscle and nerve.

This all seems, at first thought, like an unnecessary and inconsistent mess of experimental detail, involving large expense for a small end. Abundant evidence exists, however, proving the contrary. Experiments and reforms in all branches of business which have proceeded along these lines have repeatedly resulted, paradoxical as it may sound, in increased wages and decreased production cost.

THE IMPORTANCE OF LABOR-SAVING FOR THE DENTIST.

The question now comes, How does the proposition interest us as practitioners of dentistry?

The average dentist, we are told, should receive a fee of five dollars per hour. The average shop workman, we are also informed, receives about thirty cents per hour. The dentist, then, has under his management, a productive force equal to more than fifteen men in a shop, and the study of proper systematization of the labor program is thus more important to him than to the manager of a fifteen-man shop.

To put the matter in other words, the careful and systematic planning of every move in the day's routine of the principal labor element on which he depends for production is fifteen times as important from the standpoint of business economy as is the same regulation of a single average workman in the shop. If this is not a reasonable deduction, then I do not understand the principles of logic.

This paper is merely suggestive. Its aim is simply to call attention to principles the further study of which is left to individuals. To cover the subject of scientific management applied to dental practice would require more time than will be covered by all sessions of this

meeting, though I am not willing to say that I do not think it would be well worth while. I shall not, then, go into detail, to prove the exact number of inches that should separate the chair and cabinet, or the precise design of the handle on the lavatory faucet which can be operated with the least physical exertion and the greatest speed, but will merely offer a few scattered suggestions in an endeavor to illustrate the application of the system to dental practice.

THE BUSINESS WISDOM OF ENGAGING AN EFFICIENT ASSISTANT.

Let us first understand the object we are seeking—so to plan or systematize the work in the office that there will be maximum production at minimum expense. Perhaps the most important reform needed in the average dental office toward systematizing the institution in accordance with the modern industrial scheme is the proper division of labor between the dentist and his assistant, and this branch of the subject alone offers more material than can be covered by this paper.

Here we have two labor elements of widely different value. It would seem hardly necessary to call attention to the inconsistency of paying five dollars per hour for labor that can be performed for forty cents, and yet we will find on investigation that this is being done in the great majority of dental offices every day.

Before the expert on scientific management attempts the division of labor in a factory, he first determines the fitness of the various industrial elements to handle the work which must be assigned to them. His first move in the reform of a very large number of our dental offices would be to discharge that demure little schoolgirl type of office assistant who can merely swing the duster and make appointments, and replace her with an efficient secretary. The former at very few dollars per week is an office burden; the latter at three or four times the cost may be made a source of profit.

By an efficient secretary I mean one who is able to manage the clerical department; not merely to do what she is told to do, but to *think* and *act* in response to her own judgment in about nine-tenths of the matters which come to the office which do not call for actual professional knowledge and skill.

THE ASSISTANT'S DUTIES.

The productive labor element is the dentist. When he, for any reason, stops work at the chair, production ceases. Picture, if you will, the inconsistency of a system in a fifteen-man machine shop which required that the entire establishment be shut down, that every productive element stand still each time the manager wrote a letter, answered the telephone, talked with a supply salesman, or made out the monthly bills. And yet this is exactly the state of affairs that obtains in the dentist's office when he allows himself to perform any of these duties, which may be easily handled by an efficient secretary.

An able clerical assistant of the type needed costs from ten to twenty-five dollars per week. She should be able to run the typewriter (in these busy days no one has the time to solve pen puzzles); she should preferably be able to take dictation in shorthand, but above all things she should have sufficient intelligence to keep the operator at the chair where he can earn five dollars per hour.

The proper systematization of her work is a point of the greatest importance, and the equipment of her department must be ample for her needs in performing the duties assigned to her. A roll-top desk, well supplied with pigeonholes, trays for card records, letter files, etc., a typewriter, and a safe-cabinet, are among the essentials. Her department should be located in a corner of the reception room or in some other situation at some distance from the operating department and easily accessible to patients, dental salesmen, and others with whom she will deal.

She should do all of the bookkeeping, most of the correspondence, attend to the sending out of bills, tabulation of rec-

ords, buying of supplies, and the payment and collection of accounts.

BOOKKEEPING AND COMPARATIVE STATISTICS.

The bookkeeping system should be simple but sufficiently extensive to insure accuracy in accounting and ledger records, and allow of a weekly or monthly tabulation, showing gross business and profits for comparison. All business institutions should experience a steady, healthy growth. In his secretary's monthly report the dentist should find scheduled the amount of business and the cash receipts for the month, compared with the same items for the same month of the last five years; and the consideration of these figures should largely determine his business policy.

FORM LETTERS.

Much of the correspondence may be answered by the secretary personally, and in connection therewith the "form letter" should be mentioned. This is an institution the importance of which is well recognized by modern business men. Numerous letters arrive in the mail of every business man which may be consistently answered with a stereotyped reply. When the dentist goes through his mail in the morning—and it should preferably be opened by the secretary, as five dollars an hour is a high price to pay for paper-cutting—he finds perhaps three letters asking for appointments. To answer these letters with a personal reply with pen and ink would cost the average dentist about two dollars. To dictate letters to a secretary costs less, but even that is not always necessary. It is much easier and cheaper to write in the lower right-hand corner a symbol which calls for a certain "form letter."

In a pigeonhole in the secretary's desk marked "Form Letters" many of these useful elements may be filed; form letter No. 1 perhaps reading—

Mr. ———:

In accordance with your request, I send you inclosed an appointment for ———.

Hoping the time specified will be convenient to you, I am,

Very truly yours,

———

The secretary can easily do the rest.

Form letter No. 2 might read—

Mr. ———:

As you did not keep your appointment for ——— ———, I write to call your attention to the importance of continuing the treatment of the tooth we have started, without any unnecessary delay, and I respectfully urge the necessity of another appointment for that purpose at your earliest convenience.

Very truly yours,

———

The usefulness and economic value of these form letters to the busy business man is too obvious to need further reference.

SAVING TIME IN ATTENDING TO THE DAILY MAIL.

In going over the morning mail, about three-fourths of it can be disposed of by penciling a little symbol in the corner and throwing it into the secretary's basket. These symbols and their definitions may run something like this:

F. L. 1, & *A.* Send form letter No. 1 and appointment.
C. F. File in catalog drawer.
I. B. Send for itemized bill.
A. N. Record in address book under name.
A. B. Record in address book under business.

These notes and symbols are easily arranged, and easily tabulated on a list, one copy of which hangs at the dentist's the other at the secretary's desk, and they save time, money, and energy. Correspondence requiring personal replies may be dictated or scratched off roughly, with a pencil, to be typed later by the secretary.

TABULATION OF VARIOUS RECORDS BY THE SECRETARY.

In the tabulation of records the secretary will have much to do in the office of a man who appreciates the economic value of systematic business methods.

Her desk will be a cabinet of card record files.

Drawer No. 1 will perhaps be labeled "Accounts in the Hands of Collectors," in which will be filed the cards of delinquent debtors, inscribed with a memorandum of each move which has been made in an endeavor to balance the account.

Drawer No. 2, "Library Index." We cannot find time to read all that comes to us in the dental magazines, but such of it as is of special importance is checked and tabulated in this file.

Drawer No. 3 contains alphabetically indexed "Recipes and Formulæ," culled from the dental journals and other sources, any one of which may be removed and sent to the druggist or carried to the laboratory—the value of this arrangement being obvious.

Drawer No. 4 "Purchasing Index." The systematic man will do his buying systematically. Each card will be headed by the name of an article, such as "Carborundum Stones," for example, followed by the names, addresses, quotations, and evident quality of the product of firms dealing in this article, the memoranda being culled from circulars, drummers, and depot catalogs. There is one place where carborundum stones can be bought to best advantage, considering quality and price, and the systematic buyer will find this place.

I have covered considerable space in delineating the secretary's clerical duties in carrying out the principle of scientific management, though I have not touched upon one-tenth of the possibilities.

SYSTEMATIZING THE ASSISTANT'S CO-OPERATION AT THE OPERATING CHAIR.

Her assistance at the chair, if she is the all-around helper—as she must be in the majority of offices—is equally important to the economic running of the establishment.

A push-button within easy reach of the operator, connected with an electric buzzer, may convey to her the wants of the operator at the chair by a system of dots and dashes similar to the telegraphic code, thus saving time, words, and money. Two short rings, or dots, mean that she is wanted at the chair. Three short rings are the signal for a glass of hot water. One long ring and two short ones—one dash and two dots —order her to prepare modeling compound for impression for a denture. One dash and one dot mean a smaller amount of compound for a crown. And so on, *ad libitum.*

In connection with the systematic preparation of the impression material, another word should be said. Systematic management demands that such things should be done by exact methods. Detroit modeling compound, for example, according to my experiments, is softened just right for the average impression at 138°. A dairy thermometer costs but twenty-five cents. The water for the heating of modeling compound should always be brought to the temperature desired, and the results will always be uniform.

This system of accurate measurements should be carried out in other mixtures that the operator or his assistant may put together.

One and one-half ounces of water, two ounces of plaster, and one dram of salt will make the quickest-setting combination in the mixing of French's impression plaster.

Five drops of liquid and eight grains of powder will give the best mixture of Ames' crown and bridge cement for crown setting, according to my experiments. Definite quantities of liquid and powder will result in the best mixture of your favorite filling cement.

These various proportions should be determined by experiments, and tabulated. It is perhaps difficult to teach an assistant to use proper judgment in such matters, but it is not difficult to teach her to put the ingredients together in accordance with a definite formula. A signal from the push-button, without the necessity of a spoken word, will bring to the operator a certain kind of filling material, just when he wants it, mixed to just the proper consistence; not some of the time, but all the time. This is the scientific way of doing things.

After the proper systematization of

the operative department, the institution will run like clockwork. The assistant seats the patient in the chair and adjusts napkin, head-rest cover, etc. A signal informs the operator that the patient is ready. He finds her cards in a special receptacle near the chair; a glance at his carefully kept record shows him what work to begin on. He finds that the cavity needs a gold inlay; a signal brings the impression wax and tray to him just as he is putting the finishing touches on the cavity margins. The wax impression is taken; the assistant takes it to the laboratory, and immediately invests it, while the operator is putting a temporary stopping in the cavity. A signal informs the assistant that the patient is ready to be dismissed. While she is dismissing the patient with a new appointment, the operator washes his hands and otherwise prepares himself for the next patient, with perhaps a few minutes to rest. It all runs with the even tick of a pendulum; there are no waits or delays, and every minute counts.

It requires some thought and work to establish such a program, but once established it accomplishes a saving in time, money, and nervous energy, and makes labor a pleasure.

SYSTEMATIC MANAGEMENT AS INCREASING THE DENTIST'S FINANCIAL AND PROFESSIONAL VALUE.

I have offered a few scattered suggestions on a subject which, in my opinion, deserves much more consideration than can consistently be given to it in the time allotted an essayist on such an occasion as this. As before stated, this paper is merely suggestive. Its purpose is simply to stimulate thought along lines which, I believe, are important to every individual who practices dentistry.

A few weeks ago I was in conversation with one of Boston's leading business men and he chanced to mention the name of his dentist. I told him he had made a fortunate choice, as the man he named was one of the city's best operators. He said: "I am glad to hear you say so, though I never doubted it. Lacking technical knowledge on the subject, there is no way that I can judge his professional ability from my experience in his chair, but I believe that a man whose office is so beautifully systematized as is Dr. X's, would, in the natural order of things, be very likely to perform his operations with the same precision, accuracy, and attention to details." I believe that the gentleman was justified in reasoning as he did. When I see a dentist whose office is run in an unsystematic, hit-or-miss manner, and I am informed that he is an excellent operator, I am inclined to take this information with a grain of salt. That he may be clever, that he may do spectacular operative stunts at dental society clinics, perhaps is true; that he is rendering day after day for his patients what may be termed a high order of professional service, I very much doubt. Such service involves more than the insertion of good fillings or the manufacture of artistic plates.

The dentist's continued systematic study and record of each individual case that comes to him should make him more and more valuable to that patient year after year.

The ultimate object of scientific management is increased efficiency; and systematization of the dentist's office, in accordance with the general plan of this modern industrial scheme, will accomplish an increase in his value, not only to his estate, but also to every patient who applies to him for professional service.

MEASUREMENT OF THE AMOUNT OF X RAY EMPLOYED IN MAKING DENTAL RADIOGRAPHS.

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AND

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THERE are several methods of measuring the X ray, but to avoid confusion, for the sake of brevity, and because we prefer certain types of apparatus for this purpose, we will confine ourselves to a description of a technique that we have found to be eminently satisfactory.

"QUALITY," OR PENETRATION.

In the first place, every X-ray tube when in action, and no matter what type of exciting apparatus is used to actuate it, emits rays of varying quality. That is to say, every tube gives out, at the same instant, rays of high and low penetration. These high (hard) and low (soft) rays have properties which differ materially, both biologically and chemically. To be brief, the soft rays are readily absorbed by the skin, while the hard rays pass through the cutaneous covering with greater facility, so that a much smaller amount is arrested. We speak of the penetration of the ray as "quality," and it is quite essential in measuring the quantity of ray used, as will be seen later, to ascertain its quality.

There is no way in which the quality of ray can be measured with absolute accuracy, but for practical purposes we have found the method to be described very satisfactory.

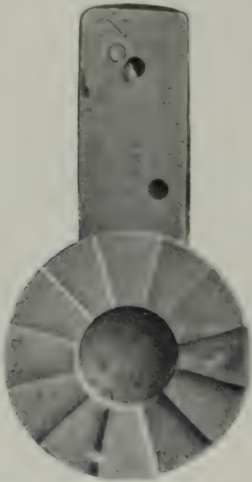
ESTIMATION OF QUALITY.

In estimating the penetration or hardness of the ray, some sort of penetrometer should be employed. There are several types of this instrument on the market, but we have as yet found nothing superior to the Benoist radiochromometer. This instrument (Fig. 1) is composed of a central disk of silver, surrounded by twelve disks of aluminum arranged like the numerals on the face of the clock. These sectors range from one to twelve millimeters in thickness. The value of this instrument is based on the following: The transparency of silver varies but little with an increase in the hardness of the rays, whereas the transparency of aluminum increases greatly as we ascend the scale of penetration power. It is obvious, therefore, that, if a radiograph of this instrument is made (Fig. 2), the shadow of one of the aluminum sectors will correspond in density with that of the silver disk. This instrument, therefore, registers the radiochromometric intensity of the ray —in other words, it estimates the degree of hardness. If it registers No. 5, as in

the accompanying illustration, we speak of the ray as No. 5 Benoist. It must be understood, however, that this instrument measures the maximum, and not the minimum penetration. In other words, a tube emitting No. 7 rays will also give out much softer rays, and perhaps a few rays of even harder quality. This fact is, however, of greater theoretical than practical importance, for account is taken of it in measuring the quantity.

The next instrument to be considered is the qualimeter (Fig. 3, A). This designates, by the use of numerals, the resistance in the secondary circuit. The resistance in the secondary circuit is governed very largely by the resistance in the X-ray tube, which, in turn, is dependent upon the degree of vacuum within the tube. A high or rare vacuum will produce rays of great penetration and also cause a high resistance. Conversely, a low vacuum will cause less resistance and produce soft rays. Obviously, therefore, if the qualimeter registers 8, 9 or 10, the resistance is high, and presumably the rays obtained are hard in quality. It must be mentioned, however, that every tube is a law unto itself in this respect. We have seen tubes causing a high resistance give off soft rays, and *vice versa*. It is therefore essential that each tube be thoroughly tested before it is used for practical purposes. Again, the resistance and consequently the qualimeter reading, will vary with the amount of current employed. This brings us to a consideration of the estimation of the amount of current used.

Fig. 1.



Benoist radiochromometer.

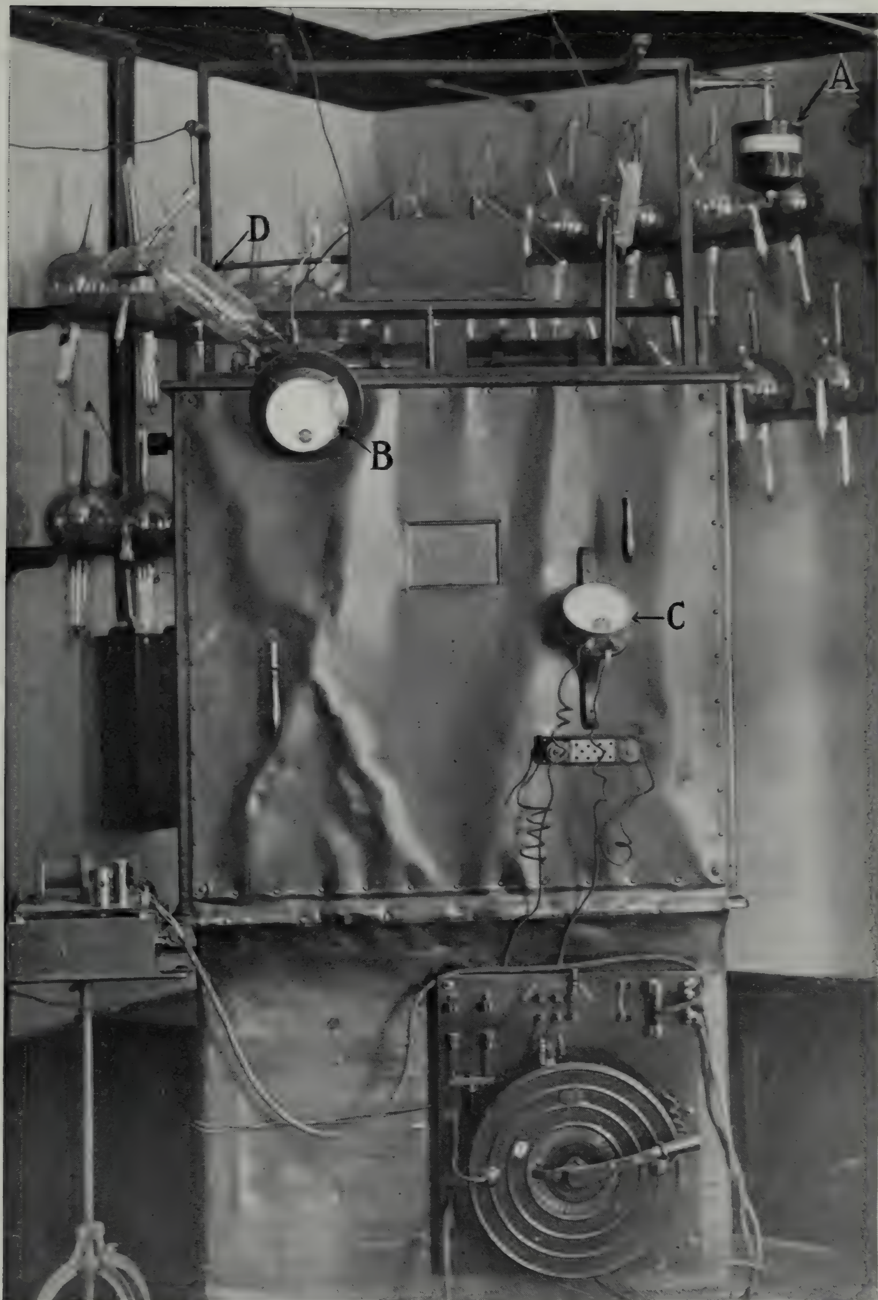
Fig. 2.

Radiograph of Benoist radiochromometer. Shows 5 degrees of "hardness."

The milliampèremeter is used for this purpose (Fig. 3, B). This, of course, is an instrument with which everyone is more or less familiar, and which requires no special description. It is connected with, and registers, the amount of current in the secondary circuit. It should be stated, too, that this instrument will not register correctly when there is any inverse current, such as is obtained when a Ruhmkorff coil is used to actuate the tube. Today, however, the inverse current is not a serious source of trouble, as a well-constructed "valve tube" (Fig. 3, D) will eliminate this objectionable feature when a coil is employed, and with the newer types of exciting apparatus, such as the interrupterless transformer, there is no inverse current to cope with.

Now as to the practical use of these

FIG. 3.



Ruhmkorff coil fitted with instruments of precision. A, Bauer qualimeter. B, Milliampèremeter. C, Ammeter, for registering amount of current in primary circuit. D, Valve tube.

instruments: An X-ray tube is connected to the exciting apparatus, and the desired amount of current is allowed to pass. Let us say the milliampèremeter registers 10 milliampères. As the "starting resistance" of a tube is always a little higher than the "running resistance," the current is allowed to pass for a second or two. Then the reading of the qualimeter is taken. Let us assume that it is at 8. The next step is to take a radiograph of the Benoist radiochromometer, while the milliampèremeter is at 1 and the qualimeter at 8. Let us say that the radiochromometric reading is 7. This means that, with this particular exciting apparatus being operated with 1 milliampère, and a reading of 8 on the qualimeter, a No. 7 B ray is obtained —that is, with this combination, a maximum hardness of No. 7 Benoist is being utilized. Now, if this same apparatus is always used with the same milliampèrage and qualimeter reading, the same degree of hardness should always be obtained from the same tube. This is known as "dosing the tube." If the amount of current be increased or diminished by adjusting the intake or raising or lowering the vacuum of the tube, the "dosing" must be done over again. Again, if the same tube and same measuring instruments are used in connection with another type of exciting apparatus, the "dosing" is again necessary. Also, every new tube must be "dosed." It will be seen, then, that so far as the estimation of the quality of the ray is concerned, certain constant factors must be recognized and utilized. It is wise, also, to "dose" a tube rather frequently, for as it "ages" it may alter its behavior in respect to the various readings already discussed.

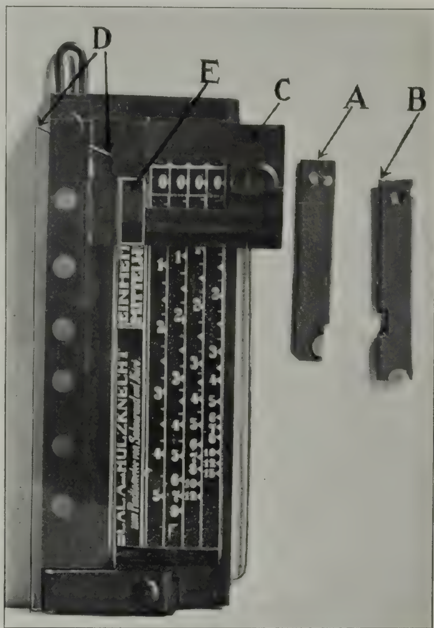
We have now ascertained the quality of the ray to be employed. It remains to discuss the estimation of the quantity.

ESTIMATION OF QUANTITY.

As with the estimation of the quality, there are numerous instruments designed for the purpose of determining the quantity of ray. We prefer and will describe only the Holzknecht radiometer (not chromoradiometer).

The principle of this instrument are as follows: The estimation of the quantity is based upon the action of the ray on the platino-cyanid of barium. This salt, when freshly prepared is of a shiny, bright green color. When exposed to the X ray it gradually assumes a yellowish brown, brown and finally a reddish brown color. It is obvious, therefore, that, if one has a standard color scale, an exposed tablet can be compared with it and the reading made in units. This, then, will give an idea of how much ray has been administered.

FIG. 4.

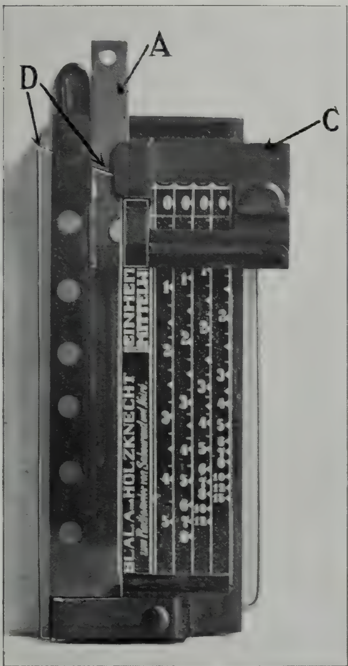


Holzknecht radiometer. A, Index pastil. B, Measuring pastil. C, Sliding arm. D, Colored celluloid band. E, Colorless piece of celluloid. F, Holzknecht's scale of units.

The instrument itself may be described as follows: The only parts that require a description are A, B, C, D, E, and F of Fig. 4. A is a half pastil of the double cyanid of barium mounted on

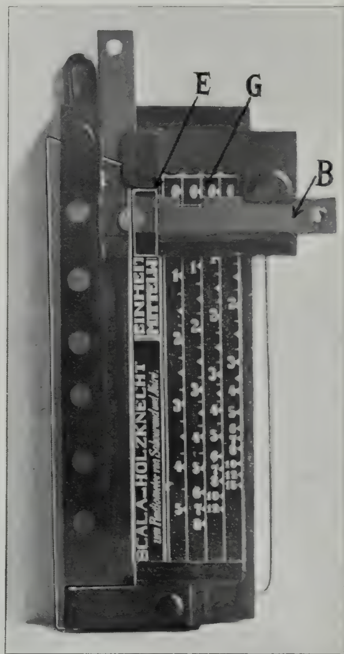
a piece of heavy black cardboard; this may be designated as the index pastil. B is the remaining half of the pastil mounted in a similar manner; this we will call the measuring or reacting pastil. C is a sliding arm into which are inserted both A and B. The arm slides up and down the instrument, as will be shown later. D is a celluloid band or strip about an inch wide, which extends from the top to the bottom of the instrument. It is colorless at the top and gradually assumes a reddish brown tint as one progresses downward. This band is stationary, and the inner end of the sliding arm C is under it. E is a small piece of colorless celluloid placed on the sliding arm, under which the measuring pastil B is placed. F is the scale of units generally employed, and known as Holzknecht units. Fig. 5 shows the index pastil A in position in the sliding arm C and under the

FIG. 5.



Holzknecht radiometer with index pastil in position.

FIG. 6.

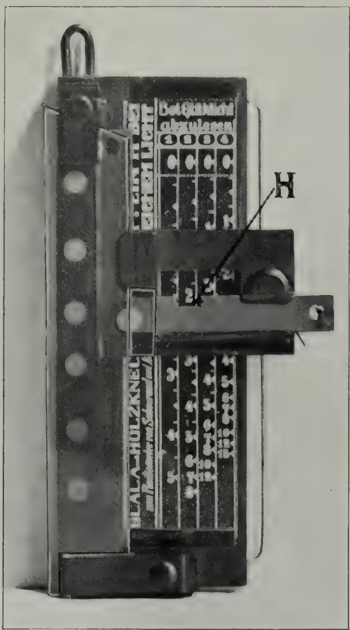


Holzknecht radiometer with both the index and measuring pastils in position.

celluloid band D. Fig. 6 shows the measuring pastil B also in position on the sliding arm and under the piece of colorless celluloid E. It might be stated here that the object of this small piece of colorless celluloid, which is always over the measuring pastil, is to insure that the refraction will be the same for both the index pastil and the measuring pastil. G (Fig. 6) indicates where the reading is made. Fig. 7 shows the sliding arm in a lower position. Here the index pastil is under the dark or colored portion of the colored celluloid band, while the measuring pastil, which has not been exposed to the ray, and therefore has not changed in color, is under the colorless piece of celluloid. The illustration shows a distinct difference in the shade of the two half pastils. It will be remembered that, when this sliding arm was in its original position (Fig. 6), both pastils were under color-

less celluloid, and therefore at zero they accurately matched in shade. Now, however, they do not match, but if the measuring pastil had been exposed to the ray sufficiently to have made it match the index pastil, as demonstrated in Fig. 7, the reading would be 2H units (at II).

FIG. 7.



Holzknecht radiometer with sliding arm at lower level.

PRACTICAL APPLICATION OF HOLZKNECHT UNITS IN RADIOGRAPHY.

Holzknecht units have the following significance: One unit is one-third the quantity of ray necessary to produce an erythematous reaction of the skin of the face of a middle-aged male. In order to administer the maximum amount of ray without reaction, the following units may be applied: To middle-aged adults—Face 2H, scalp and joints 3H, body 4H; to children—1H, 2H, and 3H, respectively; to aged individuals—3H, 4H, and 5H, respectively. This amount can be applied at one sitting or divided into multiple exposures. But no more than these quantities must be administered in the course of four weeks.

The value of these units will vary according to the quality of ray employed. The figures above given appertain to a quality not lower than a No. 6 B. If a higher quality is employed, the dose may be increased, while, conversely, if the quality is softer, the dose must be diminished.

The quality of ray ordinarily employed in dental radiography is between 6 and 8 B, and a filter of one millimeter of aluminum is used to absorb the very low rays.

An important point is that the estimation of these units is made with the measuring pastil placed exactly one-half the distance between the anode of the tube and the skin. It is possible, and we prefer it, to place the pastil on the skin. This requires multiplying the number of estimated units by four. That is, if, with the pastil on the skin, 1H is read, 4H has been administered. With this technique it is not necessary to work with the tube always at a fixed distance from the patient, although it is advisable for the novice to do so.

Inasmuch as the pastil that has been colored by exposure to the ray will rapidly assume its natural color again when exposed to daylight, a thin black-paper covering should be placed over the measuring pastil (Fig. 8). The examination or comparison must be made by artificial light—preferably a 16-candle-power incandescent electric light. A black background must be utilized. The examination should not be too long, as even artificial light will slowly restore the color. The incidence of light should always be the same—in other words, the comparison of colors should be made always under the same conditions. After making the exposure, the pastil must be examined at once, as dry atmosphere will restore the color, while heat (above 100° F.) is likely to increase it. The measuring pastil and the index pastil must be an exact match at zero. All unused pastils should be kept in a humidor that has sufficient ventilation to prevent mildewing. Used pastils may be restored almost to normal and util-

ized the second time, but it is not wise to do so.

practical points—the only ones that have given us any concern.

FIG. 8.

Showing measuring pastil covered with black paper and placed on the skin.

There are many other factors concerning the preservation and accuracy of the pastils that might be discussed, but we believe we have mentioned the most

"DOSING" OF TUBES.

In radiographic work it is not necessary to measure the quantity at every ex-

posure, for, as in the case of the quality, the tube can be "dosed." For instance, with an ascertained quality of ray (as previously explained), and with the tube at a definite and fixed or constant working distance, it is determined how many seconds are required to obtain the safe maximum dose. In other words, with a fixed amount of current in the secondary, a definite reading on the qualimeter scale, and the tube at a fixed and constant distance, the tube is "dosed" for quality. With this quality ascertained, the tube is then "dosed" for quantity. If these "constants" are maintained, this same tube can be used over and over again without "re-dosing." It is simply necessary to bear in mind that the tube should be occasionally "dosed" for both quality and quantity.

A "milliampère minute" is the application of the ray with one milliampère of current for one minute. This idea can be borne in mind while "dosing" the tube, and fractional doses can be estimated in milliampère minutes or seconds.

DANGER FROM DENTAL RADIOGRAPHY.

The taking of one or two film dental radiographs is not associated with any danger to the patient, providing too soft a ray is not employed and the tube is not too close to the skin, and especially when a suitable filter is used. But when a large number of exposures are made, or when plate radiographs are necessary, in complete radiographic examinations, it is certainly advisable to know, with a reasonable amount of certainty, how much ray has been applied. We have seen a defluvium or falling of the hair from the scalp after the application of 3H of B 9 and this amount is likely to be given in the examination of the nasal accessory sinuses or even in an extensive radiographic examination of the teeth.

In conclusion, we admit that this communication represents a very incomplete dissertation of such an important, disputed, and complicated subject. Our object in presenting this theme is to encourage a more exact and careful technique in dental radiography.

REPORT OF A CASE OF REPLANTATION.

By W. A. MORRISON, M.A.C.D., D.D.S.(Univ.Pa.), Melbourne, Australia.

THE case of replantation described below presents somewhat unusual features, both in the circumstances under which it was deemed advisable to perform it, and in the operative technique employed.

Mr. C. G., twenty-three, presented on April 2, 1913, with caries of the second degree in the lower left third molar. The cavity was small, and an amalgam filling was inserted forthwith. This tooth was impacted against the second molar, occasioning neuralgic pains on the left side of the face.

Two years and three months previously a skiagram had been made, which revealed the condition indicated in Fig. 1. At that time a small part of the crown was excised, leaving a slight space between the third and second molars, and two attempts were made to extract the third molar, without success. The dentist considered it unwise to exert very much force, owing to the denseness of the alveolus, and the liability of fracturing the roots. The difficulty of extracting was increasd by the shape and direction of the roots. A study of the skiagram (Fig. 1) will show these roots without the usual curve—which would have facilitated extraction in this case—but continuing in the axis of the crown, and, moreover, with the apical portions converging. The patient was then ad-

vised by both his dentist and medical adviser to undergo a surgical operation on the ramus as the only means of removing the impacted tooth.

In the two years and three months' interval between then and the patient's consultation with me, the neuralgia had

Fig. 1.

continued at intervals, and, the pain from this becoming severe and the cavity referred to having also made its appearance, he wished to know whether conditions still indicated an operation on the mandible as the only solution of the difficulty.

A fresh X-ray photograph was obtained which shows the case as it came

Fig. 2.

into my hands (Fig. 2). After consultation with Dr. J. S. Buchanan, who strongly deprecated the bone operation except as a last resort, the writer decided upon the following procedure:

Under a general anesthetic the second molar was extracted, necessitating considerable force, and dropped into normal saline solution. The third molar was then removed without much difficulty (Fig. 3), and the socket of the second molar was plugged temporarily with borated gauze. While the patient was regaining consciousness, the root foramina of the second molar were enlarged and plugged with small amalgam fillings of DeTrey's alloy, and carefully burnished. An opening was then drilled into the pulp-chamber with a No. $\frac{1}{2}$ round bur at the neck of the tooth, and two or three drops of formalin injected into the pulp, which had been vital, and this opening also plugged with amalgam. The socket was syringed out with slightly carbolized water, and the tooth put back in the alveolus, going into place with a snap. Momentary pain was felt, which would, I think, have been

Fig. 3.

but slight but for the reaction on the part of the patient consequent upon nervous tension and several nights' broken rest before the operation. I should here mention that a few days previously I had made a small splint of silver, 29-gage, gilded, covering the crowns of the lower left teeth from the first bicuspid to the second molar inclusive. Immediately after replacing the prepared tooth, Eggler's automaton was applied, and the splint cemented into place.

Subsequent treatment consisted in lavage with hydrogen dioxid and weakly carbolized water every second day, and later at longer intervals, and local application of aconite, iodin, and capsicum—Pickerill's formula. The patient assisted with frequent use of an astringent mouth-wash and massage of the gums.

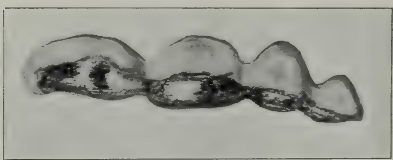
For two or three days immediately after the operation the patient com-

plained of neuralgic pains and restlessness. To meet this condition, which I attribute to disturbance of the inferior dental nerve, due to removal of the third molar, the following prescription was given:

℞—Aspirin,	gr. 10
Caffein citrate,	gr. 2
Phenacetin,	gr. 5. M.
Ft. cachet. vi. talis.	

This acted as a sedative, but was found rather depressing, therefore discontinued. The suggestion of a small bottle of stout every day met with the patient's cordial approval.

FIG. 4.



At the end of two weeks, I commenced the gradual removal of the splint, grinding away the articulating surfaces at all points of contact at each visit. When removed finally at the end of seven weeks it appeared as shown in Fig. 4. A small piece of the external alveolar plate was exfoliated during the sixth week without any disturbance. The healing process of both sockets was entirely normal, and without the least discomfort.

At the present time—fourteen weeks after the operation—the replanted tooth is in perfect condition, and quite firm in its socket. Strong digital pressure does not produce the least movement, and there is every indication of complete and permanent union.

My reasons for describing this case at length are twofold. In the first place, a strictly dental operation obviated somewhat serious surgical interference in the mandible in close proximity to the inferior dental foramen which would have necessitated an incision through the cheek and the accompanying danger of sepsis after chiseling the bones. The patient was also saved the inconvenience of entering a private hospital, and painful post-operative attention.

Secondly, with the exception of two or three drops of formalin injected into and sealed up within the pulp chamber no strong antiseptics were used, the surfaces of the tooth and the peridental membrane coming into contact with normal saline solution only, and the alveolus with only borated gauze and weakly carbolized water.

In this way all possibility of irritation or impairment of the soft tissues was eliminated, and I believe it is chiefly due to the use of aseptic, as opposed to the usual antiseptic measures, that the success of the operation, up to date, must be attributed.

[While the operation as described by Dr. Morrison is of interest as an alternative course of procedure affording a way out of a difficulty frequently presented by these annoying cases of third-molar impaction, it is not to be lost sight of that, at its best, the second molar in such cases is, after all, a reimplanted tooth, and that its normal standard of "expectation of life" and functional usefulness can be no better than that of implanted or reimplanted teeth in general. Further, as a technical procedure, the author's method of dealing with the pulp chamber and its contents is open to the serious objection that, in course of time, the formalized pulp tissue is likely to part with its antiseptic and undergo disintegration, with all of the consequent chances of infection and unpleasant and often damaging results which ensue from that cause.—ED.]

PROPHYLAXIS.

By BURTON LEE THORPE, M.D., D.D.S., St. Louis, Missouri.

(Read before Section III of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

DENTAL literature of the present day is teeming with articles on prophylaxis. Yet nothing particularly new is advanced in them; we find only ideas as old as civilization itself, handed down from one generation to another and enlarged upon, in a new dress.

ORAL HYGIENE IN ANTIQUITY.

The necessity of the cleaning of the teeth was dwelt upon by the Egyptians, three thousand years before the coming of Christ, as an aid to physical beauty as well as a prophylactic measure.

The ancient Hindus, Chinese, Greeks, and Romans also preached and practiced mouth hygiene, and, I doubt not, were more familiar with hygienic rules than the average layman of today. To them a clean mouth was indicative of culture, cleanness, and health, as it is at the present time.

The Bible contains several references proving that the above assumption is correct. In Amos iv, 6, we find the children of Israel, 787 years before Christ, being admonished by Amos the prophet: "And I also have given you cleanness of teeth in all of your cities." In Gen. xlix, 12, we read: "His eyes are more beautiful than wine, and his teeth whiter than milk." In Prov. xxv, 19, we read: "To trust an unfaithful man in the time of trouble is like a rotten tooth and weary foot." Ecclesiasticus xix, 26, 27, says: "A man is known by his looks, and a wise man, when thou meetest him, is known by his countenance. The attire of the body and the laughter of the teeth and the gait of the man show what he is."

THE EVOLUTION OF HEALTH CONSERVATION.

The earliest writers on prophylaxis, such as Paré and Fauchard, as early as 1728 emphasized the need of a thorough scaling and polishing of the teeth by the dental surgeon, to be followed up by attention on the part of the patient. Joseph Fox, in 1806, re-emphasizes this need.

The practical application of several comparatively recent discoveries in medical science having been followed by remarkable benefits to the community, renewed interest has been aroused in "preventive medicine." This term is a technical expression. Although the general idea it is intended to convey is well understood, it is not an appropriate term, in the way in which it is frequently used. "Health conservation" is more descriptive, broader, and more expressive. Health conservation is "as old as the hills." Research of ancient records shows it to have been associated with the earliest beginnings of the human race. Moses, the Hebrew lawgiver—transmitting, no doubt, knowledge he had received as part of his education in the Egyptian court—gave to his people precepts regarding health conservation that hold good in this year of grace 1913. Much has been said of the advanced civilization of the ancient Egyptians, and especially of their knowledge of medical matters. The records, however, are meager: they are suggestive, but are

fragmentary, and leave far too much to be inferred for them to be accepted as evidence. The Mosaic laws may justly be considered as embodying the best and most approved teachings of the old Egyptian medical leaders.

It is only in very recent years that medical science has unraveled the "reason why" underlying those ancient precepts. Step by step, very slowly indeed, as science and as the general intelligence of humanity advanced, and the masses appreciated the needs and means of betterment, "health conservation" attracted more and more attention and assumed an important position in all progressive communities. Cleanliness, hygienic living, good food, lessening the stress of the masses and placing a higher value upon human life, have all been factors tending to lessen human suffering and reduce the death rate; they have been health-conserving.

Inoculation, and later vaccination, may perhaps be considered the beginning of real preventive medicine; it was, however, a step in the dark. It has proved effective, beyond question, and yet, after many years, do we know the reason? During recent years medical science has achieved its most remarkable triumphs in conquering malarial disorders, typhoid fever, and the fatal sleeping sickness, and in arresting the ravages of the hookworm of our southern states. These triumphs have not come as a quick return to the expenditure of effort; they are the culmination of many years of close observation, the result of the untiring industry of many patient workers who, step by step, kept everlastingly at it until the goal was reached and the way made easier for further triumphs. The "reason why," in all these cases, is well understood; the mystery has been solved, and the means have been made known by which these disorders may become of the past.

EARLY LITERATURE ON THE TEETH, THEIR DISORDERS, AND THEIR CARE.

"Oral prophylaxis," so called, is now to the fore. We are apt to speak of it as something new; it is merely a re-presentation or a new presentation of something very old. The world's knowledge has been constantly advancing, old ideas are coming to the fore in a new dress, and are looked upon from new viewpoints. They assume new importance—at first, perhaps, an exaggerated importance. It takes some time to bring to bear the records and experiences of the past and compare them with those of the present, and to determine where and how they differ, and, if they differ, whether they show a real advance. We are hampered in this comparison by the mutilated condition of the older records. The originals have all been lost. They have been copied, revised, and brought up to date so often that they are practically without date, and of uncertain authorship.

Again, we must remember that the world has had its "ups and downs." Civilization has had advances and lapses. Barbarians have now and again broken in upon highly cultured people, and swept them and their advanced ideas from the face of the globe, and we know them only by careful search of their ruined and buried cities. All through, however, enough has been discovered to show that from the very earliest days of the world's history the teeth have been recognized as a marked feature of the human face. Regular teeth have been universally recognized as a mark of beauty; the loss of the teeth has been considered a disfigurement, and their decay deplored. We do not know when medical literature began. The oldest record extant is a text-book, a revision of a previous one by an unknown author. In this we find references to show that the teeth, their importance, disorders, and treatment was duly considered. The fullest and most reliable of the old records are the texts of the Arabian medical writers. Many of their names have come down to us, and, as they and their teachings dominated the medical world for five or six centuries, they have had many revisers whose works are preserved in medical libraries. They all contain a more or less extended chapter upon the care and disorders of the teeth. They make very interesting reading, especially for those interested in oral prophylaxis. We are admonished to give the teeth

daily care, to remove promptly from between them particles of food after eating; to avoid sweet or sour or sticky food, to guard the emotions, to beware of articles of food that put the teeth on edge, to avoid using them on hard objects, and to avoid certain articles of food supposed to have a harmful effect upon the teeth. That uncleanliness of the mouth and teeth contaminates the food and leads to serious systemic disorders was well understood, although the why and wherefore may not have been known.

Martial on Teeth. Martial, the Roman poet, society man, and politician, who lived during the first century of the Christian era, and whose works have the unique distinction of being much better preserved than those of any of his compeers, gives us a little insight into the dentistry of his day. The older dental writers cite him as a dental writer, but in that they err. He speaks of sponges for cleaning teeth, of the joke of presenting a package of tooth powder to one having no teeth, of artificial teeth, and he refers one of his characters to a repairer of teeth. He speaks of toothpicks, and pokes fun at an old discarded society man who was frequently seen after the lunch hour conspicuously picking his teeth, but who had no teeth to pick. He also recites a case of what we would now probably call pyorrhea, absolutely cured, in the good old-fashioned way, by two vigorous coughing spells; the patient coughed the teeth out. This individual was almost as unfortunate as old Cervantes, the author of "Don Quixote," who in describing his own face makes his misfortune the basis of a very old joke. The main feature of his description was: "Two teeth in bad condition, unfortunately not placed properly so as to be opposite each other."

SPANISH, GERMAN AND FRENCH EARLY WRITINGS.

The oldest Spanish dental work extant is a family dialog on the importance and means of keeping the teeth clean, with illustrations of instruments for removing tartar and cleaning the teeth. A work intended for the laity appeared about 1555. The first German work on the teeth, dated about 1480, which seems to have been on the market in various editions until about 1620, is of the same order. Its wording is quaint, but on some points it would pass muster today. It is mainly made up of quotations from Arabian medical writers of a thousand years ago. The first French, English, and American dental works likewise treat of the care of the teeth, their importance to our well-being, and what should be done to prolong their usefulness; indeed, there is a host of dental publications that deserve to be better known than they are, written for the instruction of the public, professing to teach how the teeth can be preserved in comfort and usefulness from infancy to extreme old age. The general principles of these instructions are the same in all these works, and closely agree with accepted practice of today. Fauchard's excellent work was written by a dentist expressly for dental students, and goes more into the technique of mouth prophylaxis. We may be more thorough, we may have better instruments, we may medicate to better advantage, but how far have we advanced beyond the mechanical removal of deposits by instruments and abrasives, gum massage, and the application of remedial agents to restore the soft tissues to a healthy condition, and when these fail—a handy pair of forceps as a specific? All these remedial agents Fauchard knew and taught. Most of us, if not all, would doubtless balk at his suggestion to use "one's own freshly voided urine each morning as a mouth-wash," notwithstanding its reputed virtues.

L. S. PARMLY'S WORK IN DENTAL PROPHYLAXIS.

Dr. Levi Spear Parmly, it may be said, was perhaps, of the dental practitioners of his day, more nearly representative of the progressive dental practitioners of today so far as tooth preservation in its broadest sense is concerned. He taught dental prophylaxis, he was also dentist to several ladies' schools, and firmly believed in arresting dental caries in its first onset when sys-

tematic preventive care failed. He gave lectures in his parlor to which he invited mothers and those having the care of children. He published several works giving instructions regarding the care of the teeth, one—and a well-written one—of "vest-pocket" size. As early as 1817 he was denominated the "Apostle of Dental Hygiene." He wrote and published (signing himself "Dental Professor") a series of brochures on "The Care and Treatment of the Teeth." His one theme in all his writings was *cleanliness.* He presents, however, no other means for attaining it than those well known long years before he wrote, and that essential of today, viz, surgical means.

CONFESSED FAILURE OF ORAL PROPHYLAXIS.

It will be well to take these citations to heart; to bear in mind that oral prophylaxis is not new, but at least a thousand years old, and that, notwithstanding its long preachment, dental caries is far from being a thing of the past. It is generally conceded that preventive measures and advances in the technique of the medical profession have, during the last few decades, added several years to the life of a generation. While our profession has advanced greatly, what has it accomplished in the same line? As a result of their profession's advancement, medical men have far less to do. Is that the case with the dental profession? If not, why? It is generally conceded that in order to meet properly the demands of the community, more dentists are needed and more dentistry must be done. This is a candid confession that our prophylaxis has failed to produce practical results. It is high time that we overhaul the past and revise our forecasts of the future in an earnest effort to ascertain the reason why.

No treatment, internal or local, has yet been discovered as a panacea for the removal of oral accumulations or for the cure of mouth diseases. The surgical removal, only, of deposits, and brushing, polishing, and massage, both by the dental surgeon at stated intervals and later by the patient daily, is the only known method. The mass of our profession call to mind the old family physician who, when asked, "Do you treat the skin?" answered, "Yes, and everything in it." The average dental practitioner attempts every operation incident to disease in the oral cavity. Yet in many cities, it is true, the practice of dental surgery is divided into specialties, viz: Oral surgery, orthodontia, prosthodontia, operative dentistry, extraction of teeth, and prophylaxis. The latter treatment, consisting of the hygienic care of the oral cavity—which is only a cavity when the jaws are opened wide; when closed, this so-called cavity is filled with tongue, teeth and muscles—is, of all operations incident to dental procedure, in the writer's opinion, the most essential.

RECENT ADVANCES IN ORAL HYGIENE.

Since medical inspection of public schools was inaugurated a few years ago, dental inspection has gone hand-in-hand with it, and now is recognized to be as important as medical inspection. It was inaugurated in Germany, in 1888, where the wonderful pioneer work of Jessen at Strasburg first opened the eyes of the dental world to the realization of the possibilities to be accomplished. Already in America are some 200 school dental clinics, and dental inspection is being carried on successfully. The marvelous findings of the Cleveland and Rochester school clinics are proof beyond dispute of the necessity and value to be derived from this great work. On a new line of prophylaxis the school inspection has been inaugurated; and this turning to the children, teaching them how to care for their teeth, arresting decay as soon as it begins in their teeth, is the new prophylaxis that promises much better results than were obtained by the old. The old was remedial, the new is to be preventive. This is a broad distinction, and is to be the most valuable—as a generation to come will prove.

The beneficent and philanthropic gift of \$1,000,000 by Thos. A. and John Hamilton Forsyth of Boston toward the erection and maintenance of a dental infirmary for the free care of children's

teeth has been another great aid in spreading the propaganda of prophylaxis. The masses as well as the dental profession have been educated in the benefits of mouth hygiene by such journals as *Oral Health, Oral Hygiene, the Dental Dispensary Record,* and by the many articles published in our periodic literature, all of which have been of far-reaching influence and of inestimable value. The knowledge has been augmented by lectures in public schools, medical societies, nurses' training schools, mothers' clubs, etc., which have materially helped in educating the laity.

The appointment, by the Commissioner of the New York State Board of Health, of Dr. H. L. Wheeler and Dr. W. A. White as consultants and lecturers on oral hygiene in 1911, the appointment of Dr. Chas. H. Oakman, by Governor Chase S. Osborn of Michigan, as a member of the Detroit Board of Health in 1912, and the recent appointment, by Governor Cox of Ohio, of Dr. Homer C. Brown of Columbus as a member of the Ohio State Board of Health, constitute a gratifying recognition of dentists, showing that both medical and executive authorities know the value and necessity of mouth hygiene and that the dental profession has at last "come into its own."

The latest contribution and one that will be of much value in aiding dental prophylaxis is the inauguration, by the National Dental Association, of the Scientific Foundation Research Commission, whose real mission is to solve the problem as to cause and effect. All of these items are mentioned to point out that the profession in America is fully awake to the great need and opportunity of the day.

A REGIMEN FOR SUCCESSFUL ORAL HYGIENE.

The dental surgeon's real duty is not to see how many teeth he can fill, but how many he can save from decay. Another of his duties is to bring about a healthy condition of the mouth, either by surgical or therapeutic treatment; but his responsibility is not fully discharged until he has educated the patient to devote the necessary personal attention to maintaining a healthy condition after it has been re-established. Much of our success depends on the cooperation of our *clientèle.* The education of the patient in the daily use of the brush will not, however, insure success for the dentist, or the saving of the teeth, if the patient depends alone on the brush and on so-called antiseptic washes or pastes. One of the greatest fallacies ever foisted on the public was the catchy slogan of a few years ago, "A clean tooth never decays"; yet this slogan, although exaggerated, has acted as a danger signal and has had much to do in awakening the public to the need of mouth cleanliness as a prophylactic measure.

After the removal of all deposits and the thorough polishing of the teeth and treatment of the gums, the patient should be instructed in the future necessary regimen that insures a cleanly and healthy condition of the mouth. A careful explanation emphasizing the necessity of daily effort on the part of the patient is time well spent, and an absolutely essential requisite—for, if the patient does not assist the operator by keeping the mouth in a hygienic condition, the time spent in explanation is lost, as will be the patient's teeth.

THE BRUSH.

The time has come when carrying a tooth-brush in one's vest pocket is no more an indication of a clean mouth than a wig is an indication of hair. The use of the so-called tooth-brush should be discouraged by the dentist, for it is used superficially by the majority, and its improper use causes more harm to teeth and gum tissue than good. In its stead a *mouth-brush* should be prescribed, viz, a brush with a flat surface, four rows of stiff bristles, and the patient should be taught to properly brush and stimulate the gums, cheeks, lips, and palate instead of just brushing the teeth. Brushing the teeth crosswise should be discouraged, and the patient should be instructed properly to brush the gum tissue of the upper teeth labially and buccally downward, and, beginning on the

palate tissue, lingually forward toward the gum margin; and to brush the lower teeth labially and lingually upward, the friction of the brush forcing the gum tissue toward the gum margins. Emphasis should be laid on the necessity of brushing and cleansing all mucous tissue of the mouth, for this is as essential as are clean tooth surfaces. If the mucous tissue be thoroughly cleansed in this way, the teeth cannot escape being cleansed also. If the patient has pyorrhea, then a specially adapted brush is indicated. The brush designed for that condition by Dr. J. J. Sarrazin has been found by the writer to be exceptionally suitable, as also is the brush he has designed for patients who have bridge work. But in mouths neither afflicted with pyorrhea nor containing bridge work, which is always unhygienic, the mouth-brush and its proper use is the greatest aid to the operator in the saving of the teeth. Personally I do not want my patients to use a brush that possesses no point of merit except the hole in the handle.

TONGUE-SCRAPER.

In frequent cases the patient presents a constipated, furred tongue. The dentist should call attention to this condition and prescribe a tongue-scraper, which, if used daily, will remove the furlike coating of mucus, so injurious to the patient's teeth and breath. The S. S. White Dental Mfg. Co. offers an excellent celluloid tongue-scraper, as do Katz & Besthoff of New Orleans, who market the tongue-scraper designed by Dr. J. J. Sarrazin. With either of these the tongue may be thoroughly cleansed temporarily, but the patient should be referred to a specialist to ascertain the cause for and to rectify the condition described, which is presumably due to disorder of the stomach or bowels.

TEN PER CENT. SILVER NITRATE SOLUTION.

After scaling and polishing the teeth, the best remedy the writer has hitherto discovered for healing sponginess, for shrinking and hardening the gums and removing sensitiveness from the necks of the teeth, and absolutely preventing new caries, is a 10 per cent. solution of silver nitrate, which may be applied freely to both teeth and gums on a large pledget of cotton. Although this is cauterant, turns the mucous tissue white, and causes the epithelium to exfoliate, it is not an injurious cauterant; it only shrinks and hardens the inflamed tissue and stimulates it. It also stains the enamel of the teeth temporarily; this stain, however, may be easily removed at a subsequent sitting with powdered pumice and polishing buffs.

A caution. In mouths which contain teeth filled with silicate or porcelain inlays, before applying the silver nitrate solution these fillings or inlays and the tooth margins should be dried and coated with a film of sticky-wax, such as is furnished by the manufacturers of synthetic cements for coating fillings after insertion. This prevents the silver nitrate solution from penetrating inlay or silicate filling margins and permanently discoloring them. The 10 per cent. silver nitrate solution positively arrests or prevents decay, if cavities are painted with it frequently, and it is especially useful in deciduous teeth. Although it stains these cavities permanently black, if the loose carious portions have first been removed, and the cavity margins have been rounded saucer-shaped with a stone in the engine, the teeth can be saved from future decay and will not need filling.

This has been proved in the clinics of Europe, where, by its use alone, deciduous teeth have been saved, without filling. As a preventive of caries, it has also proved invaluable in the writer's practice for the past fifteen years.

THE TOOTHPICK.

While the toothpick habit is indulged in by all classes of society, and is especially noticeable in public dining rooms, it should be discouraged both as one of the vulgarities of American civilization and as a habit extremely detrimental to mouth hygiene, by the dentist, who should be a teacher and who has to be a preacher to drive home some of the

truths appertaining to the welfare of his patients.

The toothpick causes irritation and laceration of the gum septum, also the crowding of food particles and septic matter under the gum tissue, which results in chronic gingivitis and periosteitis. The use of the toothpick should be condemned, and floss silk or small rubber bands recommended as preferable and less injurious. In some cases of pyorrhea, a toothpick is needed to remove the food after eating; then a quill should be recommended.

TOOTH-POWDER.

The average tooth powder now on the market is valueless. Its main body is composed of precipitated chalk, soap-root, and some one of the essential oils to flavor it.

To keep the teeth free from stains and calcarious deposits, a powder is needed that has enough grit so that, combined with the friction of the brush, it will free the teeth of accumulations and stains. Therefore a powder containing enough grit for that purpose is here recommended. No fear need be anticipated in the use of such a gritty powder. Twenty years ago, Dr. J. Foster Flagg proved that the use of pumice powder was non-injurious by polishing the teeth of his woman assistant with it daily for five years.

The inside portion of the cuttle-bone, not the crystalline extraneous part, is a safe polisher for both enamel and cementum, provided that it be pulverized until it will go through a sieve with 120 meshes to the linear inch.

I doubt if powdered pumice, used as a daily dentifrice, is injurious, if the patient PROPERLY brushes the teeth. The groove so often found, worn at the necks of the teeth, is not caused by brush or powder, but by erosion.

GUM MASSAGE.

Gum massage should be urged by the dentist, and, if the patient will persistently and thoroughly use the thumb and forefinger to massage the gum tissue, beneficial results will follow. The dentist should caution the patient, however, to massage the gums from the periphery to the center of the mouth, on the same principle as general systematic massage should always be done. This is directly opposite to what the average patient does or the average dentist teaches. Instead of massaging, they only rub and stimulate the gums. Correct massage, scientifically and thoroughly done, will aid greatly in bringing about the desired results.

PROPER FOOD SELECTION.

J. Sim Wallace and H. P. Pickerill in their recent books both contend that by proper food selection the teeth can be kept clean and their structure strengthened, and be immunized to caries, as are the teeth of the lower animals, and of certain savage races who do not use any artificial methods of cleaning the mouth. It will pay those interested in the conservation of the teeth to study the findings of these two authorities.

The time will soon come when public health boards will demand cleanliness in the selection and serving of foods, and foods that contribute to the health and the strength of a nation will have the preference. Just recently an article has been added to the public health law of New York giving authority to the state Commissioner of Health to inspect and supervise all public places such as hotels, restaurants, dining rooms, dining-cars, steamboats, and public, charitable, and penal institutions, in which food is prepared, sold, or served; and he is empowered to adopt rules and regulations for the proper enforcement of this article. Violations of this is made a misdemeanor. This prospective hygienic demand probably will be adopted in the future by all states.

The laity are gradually being educated to the necessity of pure drinking-water, sanitary sewerage, hygienic living quarters, "swatting the fly," "fletcherizing," and other modern advances in health conservation. It remains for the dental surgeon to do his duty to educate the people to the great need and contributing value of mouth hygiene and oral prophylaxis.

DENTAL PERIAPICAL INFECTIONS AS THE CAUSE OF SYSTEMIC DISEASE.

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THE ills without number which have so recently been said to arise from oral septic conditions, the increasing mass of evidence, largely clinical, which apparently proves this contention, the imminent danger that our profession, after this great cry of "Wolf!" should argue that there is no wolf, and overlook the matter, not taking it seriously, or else take it so seriously as to hurry into the ruthless destruction of organs they have heretofore been so proud to restore and retain, only to find their error when the wave of hysteria has passed—all these and many other conditions prompt this paper.

The duty we owe our patients, that they may not suffer from systemic damage from any condition obtaining in the mouth, and still may maintain their dentures in health and function; the duty we owe our medical *confrère* who has been forced into mouth diagnosis admittedly ill prepared in oral pathology, so that he may know at least what we know; the duty we owe ourselves, that we may patiently stand the censure, ofttimes unjust; that our hands may be clean, our reputation *sans reproche*—these duties demand that we discuss this matter of systemic damage from focal mouth infections and arrive at some sane conclusion, on which we as a profession are a unit, and then stand by it without indulging in the popular sensationalism which is next to treason to our high calling.

DEFINITION OF ORAL SEPSIS.

At the outset it would be well to have the condition termed *oral sepsis* well defined in our minds before entering into the question of its causes; the writer has quoted, and here quotes again, the very able work of J. F. and Stanley Colyer(1), who say:

> The term "oral sepsis" is used not to denote a specific disease, but collectively to include all chronic inflammatory diseases about the mouth. With the onset and progress of oral sepsis, there occurs an increase in the number and variety of the organisms commonly found in the mouth, especially those of the pyogenic class. Under the altered environment many of these organisms may undergo changes in virulence, either in the direction of exaltation or of attenuation, and thus some which were previously nonpathogenic may become pathogenic. The catarrhal and suppurative products which result from the bacterial activity undergo partial putrefactive changes in the mouth, and in this condition are constantly passing into the gastro-intestinal tract, together with enormous numbers of bacteria.
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> The pollution of the alimentary canal by this septic material leads to an alteration in the usual intestinal flora, and to the presence of abnormal putrefactive products, and these together may induce certain changes in the economy of the body. Thus:
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> (1) The invasion of the tissue by organisms will be largely increased, and these organisms, which are said normally to pass through the intestinal wall during digestion, will be of an altered character.
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> (2) The new flora may act locally upon the walls, and induce a catarrhal condition and variations in the normal secretions, and so lead to a disordered digestion.
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> (3) The products of digestion and the usual putrefactive changes that take place in the intestine may be directly affected by the organisms, and unnatural products result.

Against this formidable attack the body possesses certain defenses, which may be divided into "local" and "constitutional."

The *local* defenses consist of—

(1) Phagocytosis in the mouth, the process being assisted by the positive chemotactic properties of the saliva.

(2) The antiseptic action of the gastric juice. This property depends upon the presence of hydrochloric acid, which is only present during digestion, and hence its action is intermittent.

(Pickerill(2) notes the fact that many organisms may pass through the stomach as spores, thus escaping its fluids, and then develop in the intestine.)

(3) The problematical struggle for existence among organisms in the small and large intestine. But little is known in connection with this question; it must therefore for the present be disregarded.

The *constitutional* defenses are those brought about by the reaction of the tissues to the action of bacteria and their products. Collectively they constitute what is known as the resistance of the body, and they vary in degree of resistance in each individual. As the effect of oral sepsis is to throw a continuous and increasing strain upon these natural defenses, it is not surprising that at times the defenses break down, and that constitutional changes of a marked character follow.

CLASSIFICATION.

Excluding other mouth disease, the causes for oral sepsis usually arising about the teeth can now be placed(3) in—

three large common groups of septic types, viz, dento-alveolar and peridental abscesses and the different stages of pyorrhea alveolaris from gingivitis progressively onward. We can now classify oral sepsis as follows:

(A) Tissue exudate and pus freely evacuated into the mouth from pyorrhea, fistulous dento-alveolar abscess, or from any freely draining surface; ingestion and absorption of pyogenic products via the gastro-intestinal tract.

(B) Tissue exudate and pus retained in the alveolus from chronic "blind" dento-alveolar abscess and peridental abscess; pressure absorption via the blood stream by metastasis.

(C) A combination of the foregoing in advanced pyorrhea and dento-alveolar abscess, or deep necrotic surgical areas, which only drain occasionally; pus retention below the level of drainage. Damage results by methods in A and B.

So it is to be noted that, barring the group of gingival infections called pyorrhea alveolaris, and next in importance as to frequency and virulence, stand the periapical infections, fistulous and blind dento-alveolar abscess occurring in pulpless teeth, and peridental abscess on vital teeth, not always periapical, but very necessary to this discussion.

CHRONIC FISTULOUS DENTO-ALVEOLAR ABSCESS, AND PYORRHEA, AND THEIR SYSTEMIC EFFECTS.

We shall consider first chronic fistulous dento-alveolar abscess with pus constantly discharging into the mouth, the chronic form under class A where the systemic and local damage occurs by the absorption and ingestion of pus, organisms, and toxins throughout the entire gastro-intestinal tract. The changes in the mouth fluids and tract have just been mentioned, together with the modus of local and body resistance, and we must remember that added to this guard is the toxicolytic action of the liver—that burial-ground for bacteria—and the antitoxic action of the mesenteric nodes. The percentage of flow of pus from chronic fistulous periapical infection, it also must be recalled, does not approach that of pyorrhea, where, if the whole denture be involved, the pus-producing surface amounts to several square inches; for usually there is a small extra-alveolar granulomatous sac firmly covered by epithelium which only discharges occasionally. However, the flow is more constant when it does start, and deep incubation away from the chemotactic action and dilution of saliva may produce a pus of greater virulence.

Besides the local effects in the mouth arising from the continual presence of pus and what might be termed the major surgical lesions such as periosteitis and necrosis, Ludwig's angina, and parotitis, we find the sinuses and pharyngeal

ring with its contained tonsils involved, and frequently lymphadenitis of the neck glands. Hunter(4) and others accentuate principally the gastro-intestinal affections which result—as septic gastritis, enteritis, colitis, proctitis, appendicitis, and cholecystitis—and it is probable, as Colyer(1) and Pickerill(2) have shown, that the dominant systemic effects are indirectly produced by the absorption of the abnormal products of an intestinal tract put out of order by the arrival of an excessive and unusual amount of organisms and toxins from the mouth—a type of intestinal putrefaction.

When the triple guard breaks down, intestinal absorption begins, and hematogenous infection from the blood stream occurs. This differs only in degree from the pressure absorption from the retention areas to be considered later. Thus Hunter(4) mentions pleurisies, empyemas, nephritis, pyelitis, perinephritic abscesses, and ulcerative endocarditis:

> The poisons act sometimes more on one particular tissue—for example, blood (causing septicemia, pyemia, anemia), or on a nerve (producing severe mental and degenerative effects); sometimes the toxins act more on the organs of excretion—for example, the kidney (producing nephritis), sometimes on the skin (producing rashes), sometimes on the joints (producing so-called rheumatic swelling).

Another important factor in the patient's favor, and one making against the systemic toxicity of chronic fistulous periapical infection as compared to the gingival, is that the fistulous dental abscess is nearly always produced by local causes, pathogenesis in the tooth-root, and is amenable to local treatment, while the bulk of pyorrheal infection is a local, lowered cell resistance produced by some constitutional state or diathesis. Thus serious damage to and through the gastro-intestinal tract and by hematogenous processes is superadded to the defective diathetic state which produced the pyorrhea—promoting a vicious cycle, which occurs much more frequently in the pyorrheal than in the periapical infection, in which the patient is otherwise in health and can maintain that state unless chronicity be of long duration.

Further, periapical infections are generally due to one, rarely to more than two pathogenic organisms or the products of saprophytic pulp decomposition in the canal, while pyorrhea is notably a multiple infection, different organisms predominating in different pockets in the same mouth, and it is obvious that in the blood fight antitoxic factors are more easily prepared in the body, as in the laboratory, against one organism than against many. The experimental use of vaccines in each instance appears to be confirmatory of this statement.

Damage to the occlusion is another feature not to be overlooked. In pyorrhea this is grave and permanent, often affecting the whole denture, promoting a habit of bolting rather than masticating food, producing intestinal putrefaction of proteids in bulk, or a complete change of food habit to "slops," largely carbohydrate, followed by excessive intestinal fermentation, adding this element to the already disturbed intestinal flora; while in periapical infection, unless multiple, the occlusion is but temporarily disarranged, and may be shortly restored to the normal.

That chronic fistulous dento-alveolar abscesses are active in systemic and local disturbance we know to our sorrow, and the drainage of pus from them into the mouth, acting as has been stated, is most serious. But by far the greater damage is done when this is combined with absorption from the focal infection directly into the lymph channels and blood stream, for frequently the fistulous area is tortuous, pus burrowing in the line of the least resistance and draining only occasionally at a higher level, when retention is imminent.

ADVANCED PYORRHEA AND DENTO-ALVEOLAR ABSCESS AND THEIR EFFECTS.

This condition, under classification C, will now be discussed.

A clinical picture is necessary to a correct understanding of this statement. It was noted by Drs. Baer, Fayerweather, Ashbury, and the writer, and reported

in the study of a number of cases in the Johns Hopkins Orthopedic Clinic(5) that "The temperature in arthritics with chronic alveolar abscess will rise 2/5° to 1° whenever the superficial tissues heal over, closing the fistula and causing temporary retention." This implies pressure absorption of toxins, and that the opening of the fistula released that pressure, reducing the temperature. These patients had infectious arthritis, their tissues and blood were not able to furnish the necessary anti-bodies to antagonize the particular infecting organism which produced the arthritis, and so sensitive were they to toxic absorption via the blood stream, that "skinning over" of the fistulæ for a day or more—a phenomenon commonly observed by all of us—would produce this pyrexial variation. While the continued ingestion of pus from two or more fistulæ undoubtedly added its quota of toxicity, it was not so perceptible, and we had the apparent paradox of the patient being better while ingesting pus, and worse when it was not swallowed but held in the tissues.

THE IMPORTANCE OF PREDISPOSING DIATHESIS.

The systemic disturbance produced, in the norm, by acute periapical infections or dento-alveolar abscess is well known to all of us, and in this instance is most instructive, *for the escape of pus into the mouth and its ingestion has not yet occurred; all of the pyogenic elements are "locked" in the tissues.* The responses of the defensive forces of the blood and tissues to a local bone infection are so familiar as to need no mention; familiar also is the fight made by the local cells, and the results following. Early in every type of infection, depending upon its virulence, before the local generation of toxins has by positive chemotaxis produced leucocytosis, and before the proliferation of connective tissue, by fibrosis, has walled-in the abscess, constitutional symptoms always result, in the norm. The malaise, pyrexia, chill, muscle pain, etc., are all indicators of the healthy body's response to the local call for help. It is precisely at this stage of acute periapical infection that the most serious systemic disease, in the writer's experience, has occurred, such as polyarthritis, myositis, septic neuritis, infectious albuminuria, and one case each of endocarditis and toxic anemia. In the normal, even such states in mild form might exist and shortly clear up, but it is significant that they rarely exist in the majority, and it is more than significant that, in these cases reported, they persisted as real disease long after the focal lesion had been blotted out; and there can be no doubt that a regular predisposition or diathesis exists in one out of the many so infected periapically. As far as the writer's work has gone, there is but one diathesis known to him, that termed arthritism, though there are many predisposing states, principal among which stand the individuals with a tendency to repeated attacks of influenza, and those Kirk describes as of the "toxin habit." This predisposition must not be confused with the results of pus absorption producing a low pyemia, and it is in no sense a metastasis inducing metastatic conditions in the organs, nor the lowered general cell resistance following wasting fevers, as the post-typhoidal infections, all of which predispose to focal infection. Neither must the patient suffering from true arthritis be confounded with the state of arthritism—which is here used in the diathetic sense of the hyperacid diathesis in Michaels'(7) classification. When oxidation is low, and biochemical changes are slow, there is an increase in the organic acids and decrease in the alkalinity of the blood. According to Kirk(6), to whose articles you are referred, there are two dental expressions of arthritism, viz, erosion and pyorrhea, and a full classification of these diatheses as related to mouth types, compiled from other authorities, has been made by the writer(3). There have been many misunderstandings in this connection, and it is important that a distinction be made between the patient suffering from true arthritis and the general body predisposition known as arthritism.

It is most important that these individuals should be protected against themselves, so to speak; every portal of entry should be anticipated, if possible, and blotted out; no time is to be lost in long treatments, and pus formation must be prevented at any risk. Let us cite a case: Mr. D., of arthritic family history and diathesis, presented three years ago with a rheumatoid condition, later found to have resulted from intestinal putrefaction, in which a first bicuspid filled twelve years previous, and always comfortable, was involved by a fistulous periapical abscess. Strange to say, both chronic conditions responded to treatment. After the lapse of a year, a lower right molar became infected, resulting in a blind abscess. During its treatment the left knee-joint was badly involved in a rheumatoid arthritis, which did not clear up for two months after the molar was extracted. The important point in this history and treatment follows: Two months ago an upper left first molar responded to pressure tests, was opened, drained, and the root work was found doubtful by means of two X-ray films; there was all the appearance of incipient periapical infection, and the next day the knee gave premonitory symptoms of another attack. No time was lost in treating this tooth; it was extracted forthwith, when the case cleared up, aborting the second rheumatoid attack. Anyone caring to question the conservatism of this treatment is hereby requested to make his choice between two months' suffering from rheumatoid, possibly deforming, arthritis of a knee, and the doubtful prospect of curing and retaining an abscessed tooth which is apt not to function and to light up again, or the loss of that tooth and no bad knee.

Hence the predisposing constitutional state, diathesis, disturbed metabolism—call it what you please—is the most important factor in these conditions, as it is in the etiology of pyorrhea, dental caries, or any chronic oral lesion. According to McRae([8]), "Every case of bacterial inflammation is a problem in which it is necessary to gage the virulence of the organism and the resistance of the patient." He claims that the differences between local and general infection are only in degree, and not in kind: "It may be considered that every organism capable of local proliferation is theoretically capable of being found in the blood stream, and that, in the case of organisms like the pyococci (with which we are most concerned), their presence or absence is due to the numbers of them that escape at any given moment and the antagonistic power of the blood and tissues."

TREATMENT IN ACUTE DENTO-ALVEOLAR ABSCESS.

That there are many elements of prognostic interest to the dentist in the amount of local damage produced by acute dento-alveolar abscess is obvious; it is well known that few such can be drained through the root-canal. The chronic fistula left being below that level, the question immediately arises as to just how long the cementum, in which the apex of every tooth root is completed, can remain vital and be nourished, with its nutritional vessels and membranes, the peridental membrane, raised from it and the whole area floating in pus! There can be no difference between the necrosis which is bound to result in the cementum and that in bone as a septic focus, under the same conditions, except that bone will form sequestra which are exfoliated, while the cemental apex always remains attached by the dentin of the root, and cannot be sequestrated. Herein lies the crux of this whole question of the curability of dental abscesses, for in the major portion of such acute infections, which linger notwithstanding treatment, the cemental apex—which ideal pulp devitalization and root surgery leaves vitally nourished and sensitive—in these septic cases is hopelessly damaged, and remains practically a necrotic bone area firmly attached by the rest of the dental structures. So it is important to know, first, if this has occurred, and to what extent. This can be determined, in some degree, by X-ray films, after the acute stage is passed. Second, the loss of vitality is indicated by lost sensitiveness—at the canal apex

not always a sure guide, but the best at hand. When the cemental apex becomes necrotic, either in chronic fistulous or in blind abscess; when it does not shortly respond to careful root-canal medication, filling, and fistulous drainage; when we admit that the nourishing medium is cut off from the peridental membrane side, producing necrosis, why go on interminably pumping medicaments up the canal? Why not ablate such areas by a clean apicoectomy, and if that fails, extract, as any good surgeon would?

The writer wishes here to record the statement that there is, to his knowledge, no medicament nor method, germicidal, oxidizing, or electrolytic, that will revivify the pericemental apex. If it be vital, the tooth is healthy; if it be necrotic, the tooth is next to doomed. This is the point in treatment where materia medica stops and good surgery begins, and this is the juncture at which we are deserving of censure. With the best of intentions, our conservatism has been most detrimental to our patients' health. The vitality of the cemental apex is too often damaged, in clean pulp removal, by medication or otherwise. A study of a few of these cases free from pus or any symptom whatever of infection will show the lacunæ of absorption greatly exaggerated—nature's effort at removal. At best, these otherwise normal teeth are but tolerated, and as far as the blood stream is concerned these apices are a nuisance needing its constant osteoclastic cell supervision; and at any time, by hematogenous processes, they may become the foci for infection.

BLIND DENTO-ALVEOLAR ABSCESS, AND ITS DANGERS.

The foregoing septic periapical foci of acute and chronic alveolar abscess rarely result, thanks to improved technique at the hands of the dentist. In fact, he is generally consulted too late to abort them, but the type we are about to consider—class B, blind dento-alveolar abscess, where all the infective element and tissue exudate is retained without fistula or sinus—almost invariably arises from some careless or unsuccessful effort to open, cleanse, and seal the root-canal. This type may occur immediately on opening a tooth previously filled, result from aborting the fistulous stage in an acute alveolar abscess, or directly after sealing a root-canal apparently clean to every test, or may arise and persist years after roots have been filled short of the apex. Sometimes it presents on roots filled to the very apex. Numerous X-ray films attest this fact, but they do not distinguish between vital and dead cementum. It is the writer's opinion, from the specimens he has examined, that in these perfectly filled apices there was no fault in technique, but possibly from medication or other causes the apex becomes necrotic[5]:

> It is not deemed desirable to open again the discussion long continued of the sterilization and stopping of infected root-canals. When canals are accessible, or can be made so, all methods succeed which recognize the cardinal bacteriological and technical principles involved—*i.e.* thorough sterilization, not only of the canal proper but of the dental tubuli and canaliculi of the apical cementum. The closing of these microscopic afferent openings by a filling as proof-tight against any solvent action of the apical exudate as the caval filling is proof against saliva, will always give a tooth free from post-operative infection, if there be no dyscrasia. But many canals are not accessible and cannot be made so, and anything short of perfection in this apparently simple but in reality very complicated operation, where the best of technique and judgment fails at times, always means, even if there be a period of dental comfort, when the inevitable lowered cell resistance comes, a small apical pus area, all the more dangerous toxically because it is accompanied by little pain and is apt to be dismissed as trivial by the patient; the dentist is not consulted; but later the physician is asked to treat a series of obscure and distant symptoms, for which he fails utterly to find the cause.

Whatever the bacterial cause in the canal—pathogenic and toxins, or saprophytic and ptomains—the type of infection is low, whether left over from an acute condition or newly introduced and controlled to a degree by the local reaction. This is shown by the bulging of the alveolar plates, which are rarely

perforated, and the persistent fibrous tissue out of all proportion to the symptoms, local and general. It is further established by the rules laid down by Adami and McRae(8), which are most important to an understanding of this condition and its systemic sequelæ, that—"The fight against any infection is made from two sources—*i.e.* the *local cells,* largely mechanical connective tissue mesh proliferation or fibrosis, and by the *blood,* leucocytosis, formation of anti-bodies, etc." If the infecting organisms be of *low toxicity,* then the local cells are sufficient with little or no call on the blood for the formation of anti-bodies and no appreciable leucocytosis. This is typical of the blind alveolar abscess, shown by the large fibroses and small systemic disturbance. If the organisms be of *high toxicity,* the local tissue cells are quickly destroyed; there is liquefaction, hence small fibroses, and great response of the blood with antitoxins and marked leucocytosis, and great systemic disturbance. This is typical of acute and chronic fistulous abscesses. If the systemic reaction be normal, it is a far safer state than in the low type occurring in blind periapical infections, where we have the blood stream gradually sensitized for months by hourly dosage of toxins from the root-canal without the safeguarding formation of the active anti-bodies characteristic of acute infection. Let some slight increase occur in the infection from the focal area, and serious systemic disease is the inevitable result. This condition would appear almost to be a phase of anaphylaxis induced by continuous injection, extending over months, of toxins or ptomains propelled by the gases arising from decomposition of pulp tissues, or of infiltrated periapical exudates rising in the partly filled canal. What the percentage of anaerobic root-canal infections is, we do not know; it must be very high, and judging from Hartzell's(9) reported cases, a further study of this type is urgent, as it has all of the sensitizing features of the negative phase, promoting increased susceptibility to any infective agency. There can be no doubt that the dentist induces these low infections, which we consider more dangerous than the acute type, even in those without the predisposition previously described, by the use of germicides which are of low oxidizing power, or what is more likely, the failures of these medicaments or methods to reach all of the cultures in the canal—First, because of hurry in the operation; second, because of carelessness in opening and filling the canals to the apex; third, because of attempting to reach and fill inoperable canals, for a small percentage of canals can never be opened and sealed successfully. The writer firmly believes that, under any of these conditions, the common pathogenic organisms, instead of being destroyed, are only attenuated, just as they would be in the preparation of a vaccine in the laboratory, and in such states pass through the apex for a long period, cumulative finally in over-vaccination or real disease, generally of muscles and joints. As Dr. Rhein(10) has remarked, there can be no more pernicious practice than the use of the so-called mummifying pastes. The root-canal, with its contained necrotic pulp, wet at the apex by the circulation no matter how dry or well sealed from the caval filling at body temperature, in which are sealed germicides of low or even of high oxidizing power, is an ideal culture tube for the formation of toxins and ptomains and for the attenuation of organisms to such an extent that they can be introduced directly into the blood stream, to which this tube leads, for months with so little local pain as to give the patient no warning. If the operator had carried his surgery and sterilization far enough, this condition would not have happened. This explains the fact that blind periapical abscess areas are always produced after some incomplete attempt at root-canal medication and filling. It also explains the important part these blind abscess areas play in the induction of distant disease which, at first thought, is out of all proportion to the small focal infection, and the lack of pain and local suffering is convincing that classical pathogenesis is absent or nearly so.

There is another fact confirming this

idea: In the opening and drainage of the bulk of these blind periapical areas, occurring in every practice, in how few instances is there anything to drain? Rarely any pus or tissue exudate will be found in the canal, so the types of infection must be low indeed, and this feature has seriously interfered with the study of the organisms involved, for in only two or three, out of all the cases the writer has most carefully opened in the last four years, was it possible to obtain a specimen sufficient for experiment.

SYMPTOMATOLOGY OF BLIND DENTO-ALVEOLAR ABSCESS.

Two great dangers arise from the occurrence of these blind abscesses. The first lies in their chronicity, and in the failure of the dentist and patient to recognize them early enough for treatment. The patient is astonished that such conditions exist in his mouth and frequently refuses treatment. The dentist needs to be convinced and impressed again and again; he should keep on repeating, lest they be forgotten, the words of Adami and McRae: "A mild infection gives off a certain amount of toxin, and this is carried into the blood and tissue fluids, but is so diluted that we see no general bodily change wrought thereby; we neglect such mild intoxication, but it is nevertheless present." The second danger is the difficulty in really draining and curing such cases after they have existed for some time. The writer admits that he has successfully treated but few. In these diatheses drainage does little good when there is nothing to drain; root-medication and all other methods fail, except surgery, apicoectomy, and extraction. As to the systemic effect and disease produced by blind abscesses, the histories of a large number of cases are convincing, while there are many of infectious arthritis, rheumatoid arthritis, and few of arthritis deformans, two cases of endocarditis and toxic anemia and neuritis. These were all of a milder type, but much more stubborn and unresponsive to treatment than the fistulous periapical focal areas. The greater majority were very sick patients indeed, but it was difficult to place their illness in any class; it might be said to be more rheumatoid than arthritic, more muscle than joint involvement. The almost invariable history of muscle pain, particularly in the back of the neck; the muscular involvement about the joint, rather than a true arthritis in the joint, which the patients call neuritis; the effect in the blood, as of low toxemia or anemia; the pasty complexion, loss of appetite, debility, night-sweats, loss of body weight; occasionally low fever, running for weeks, rarely more than 100° and frequently subnormal; the general malaise, which Pickerill [2] aptly describes as "an increasing inability to do the usual normal day's work"; the striking resemblance to incipient tuberculosis, actually misleading in some instances—all these symptoms distinguish this type from those previously described under chronic fistulous conditions. Few cases can be found in which the general systemic infection can be said to arise *de novo* from the periapical infection. The following case, in which the writer was associated lately, occurred four years ago; it was reported by Dr. Gordon Wilson [11], and is interesting, because all other focal centers had been obliterated.

PRACTICAL CASE HISTORY.

Mrs. B., forty-three years of age, had had one or more attacks of mild but typical acute articular rheumatism practically every winter since she was eighteen years of age. Prior to most of the attacks there had been sore throat, and at times attacks of quinsy which required operative measures. Although not physician to this patient, but simply a friend, I had seen her during the attacks, and when she was free from them; her throat condition at all times showed hypertrophy of both tonsils, with a general congestion of the pharyngeal ring. After much urging, she consented to have her tonsils removed, and for the three winters following their removal she was not only free from amygdalitis and rheumatism, but noticed a marked difference in her general condition and in her ability to take comparatively long walks. This winter she had another attack

of rheumatic fever, the joints of the wrists, fingers and ankles being involved, and her family physician referred her to Dr. Wm. S. Baer for special treatment. Dr. Baer very kindly told me of his findings, which were that, in addition to the joint involvement mentioned before, he found that there was no evidence of inflammation in the throat, as the previous operation had been absolutely successful. Although the teeth appeared to be in an absolutely perfect condition, as Mrs. B. had just had the dentist examine her teeth a month previously, and as she suffered no pain, yet, on pressure being exerted along the border of the gums well above their free border, an area of tenderness was noticed over two apparently strong and healthy teeth (upper left molars). An X-ray picture was then taken of these teeth, and there was found the distinct shadow, at the base of each, characteristic of pus formation; on withdrawal of these teeth, pus cavities were found. After the removal of the teeth there was a rapid and uneventful recovery from arthritis.

Six months ago this same patient presented with an abscess of twenty-four hours' incubation on the upper right second bicuspid, the roots of which were well filled, as the writer knows (for he opened them), having been in perfect health since the attack just reported. An attempt was made to drain and treat this tooth. In a few hours, the patient could not walk from swollen knees. The right hand also was involved. The tooth was hastily extracted, and the case cleared in one week.

THE FAR-REACHING EFFECTS OF "STRAIGHT" PERIAPICAL INFECTION.

The symptoms arising from "straight" periapical infection, when that can be diagnosed, are not so pronounced, nor so easily related as to cause and effect, as in other focal infections—for instance, via the tonsillar crypts, a lymphoid tissue where the streptococcal toxins are carried directly to the blood stream. The writer has seen a case of endocarditis of long duration, in a child, the patient being too reduced to chance a tonsillotomy, where the cauterization of the crypts varied the rising temperature for three days; not so with the blind abscess, buried in bone, where the absorption of toxins is much slower, but is far more stubborn when once begun, even apicoectomy or extraction requiring days to show results, and medication producing no result whatever.

Daniel[12] emphasizes the fact that arthritis may be secondary to a disease in some other part of the body, even years after the subsidence of the primary infection, and the great majority of these cases were multiple infections, in which one or more portals of entry were involved, first, as most commonly associated, the tonsils, next the appendix, the genito-urinary tract and the gastro-intestinal tract, and particularly the pharyngeal ring and sinuses, in the coryzas and grippe colds or true influenza. Here we have the periapical condition as cryptogenic infection. This has been observed by every dentist—a common cold and sore throat, and an old pulpless tooth well filled for years, with a bad abscess via the blood stream; why should not a grippe or influenza, a tonsillitis, appendicitis, or any distant infective area develop similar results?

ILLUSTRATIVE CASES.

Two cases may be cited in illustration. Miss S., in whom a well-filled pulpless first molar, quiescent for ten years, developed a blind abscess, complained of what she called rheumatic pains in the leg and arm muscles. The surgeon found a chronic appendicitis, of what duration no one could say, for which he operated. The abscess persisted, as did the muscle pain, until the tooth was treated, when the case cleared.

In the case of Mr. W., the lower left second bicuspid, well filled to the apex for six years, developed a virulent blind abscess following grippe infection with empyema of the antrum on the opposite side, both responding to treatment. These factors are reflected immediately in the diagnosis and treatment, which is by exclusion, and the patient has occasion to alternately bless and curse this day of specialists, for every possible portal or entry is explored by each specialist in turn—the sinuses and throat by the laryngologist, the gastro-intestinal

tract by the stomach specialist, the appendix and the other organs by the diagnostic specialist, while the genitourinary specialist and gynecologist play their part, as does the dentist in a thorough study of the mouth.

"The dental diagnosis in the cases reported(5) was made for pulpless teeth by isolation and thermal change; for peridental defects by percussion and sound. The best results were obtained by high digital pressure in the commissures on the alveolus over the apices of all the teeth. Any spot showing the slightest tenderness (and this was not always indicated in the tooth proper) was X rayed. A study of these pictures was made with the patient in the chair, and the fillings, crowns, etc., removed from all doubtful teeth. Drainage and regular abscess treatment were established via all canals, and in some instances alveolar curetment and apicoectomy."

Gradually every focal infection is removed, and generally the tooth will persist long after the primary portal has been closed to further infection. The periapical focus now becomes the reservoir for pus absorption, secondary but just as dangerous as the primary portal.

A case in point may be cited: Harry A., ten years of age, suffering with recurring tonsillitis and six abscesses, some fistulous, some blind, on deciduous molars. He developed a slight attack of endocarditis; the tonsils were removed, with slight improvement in the heart valves, until the six teeth, which showed no sign of improvement by treatment, were extracted. This operation was followed by slow recovery.

It is most difficult to get the dentist to understand this multiple type of infection. He either reasons that the patient should recover soon after dental treatment, and if he does not, denounces the whole thing as a hoax, or goes to the other extreme, and says it is all lowered vitality, malnutritional susceptibility, etc., so, "What's the use, anyway!" the patient might as well have his teeth. It is sometimes very difficult to say which was the first focal infecting portal of entry in these cases, which are all chronic and complicated—the periapical or some far distant region, generally lymphoid in character; but of one thing we are assured, viz that, if once infected, none of the cases clear until the periapical focus be obliterated, be it primary or secondary reinfection.

To quote a case: Miss H., bedridden and confined to the house, and for years under the care of a stomach specialist, finally recovered from a severe intestinal putrefaction. Her joint and muscle symptoms were pain up and down the spinal column, particularly in the cervical vertebræ. Dr. Baer noticed a few slight joint changes about the vertebræ, not clear in the X-ray film. The writer saw her at home, and diagnosed a pyorrhea and six doubtful periapical areas, out of which, in the skiagraphs obtained, five showed defective canal work. Her dentist did what he could at the bedside, with little success. She was taken to a pyorrhea specialist, who cleared the pyorrhea, with little improvement in health. She was then brought to the writer's office, where all the roots were thoroughly opened and drained, without result, except that the invasion of one canal was suspected as staphylococcal. Crowns and bridges were removed and two teeth extracted. In two weeks the patient could stand the journey to the office in the car, which had heretofore been impossible. Dr. Baer in co-operation with Dr. Dwyer began vaccination by mixed strains of staphylococcus, with marked improvement, which immediately fell off when the vaccination stopped. The three remaining teeth were then extracted, the vaccination continued at longer intervals, and now the patient can enjoy the full day on her feet and is normal in every way. It is worth noting that out of five of these teeth four were molars, and in only one canal was there the least symptom of a discharge; the pyorrhea was also greater about the molars.

ETIOLOGICAL AND BACTERIOLOGICAL CONSIDERATIONS.

This case is quoted at length for two reasons—*First,* to illustrate its vicious

cycle, intestinal putrefaction, the absorption of ptomains via the intestinal tract, presumably producing a pyorrhea, the existence of five blind periapical areas due to bad dental work, and the absorption of toxins via the blood stream, one or both causes producing what came near being a permanent and fatal infectious spinal arthritis. Notwithstanding the vaccines, no results were obtained until all the dental portals of entry were cleared up. Which was cause and which effect we do not know. Fortunate the patient and more fortunate the operator who recognizes such a case so early as "to put his finger" on the primary portal of septic entry! *Second,* because of the convincing clinical argument which vaccination, as with these strains of staphylococcus, brings to bear on the cause of periapical infection. Many such cases confirm the writer's long held opinion, that the major part of root-canal infection is due to the staphylococcus; that the rare cases, which are nearly always fatal to the tooth, if not the patient, are due to the streptococcus, and that the increasing number of cases of recurring terminal infection occurring in well-filled roots is largely due to the bacillus of Pfeiffer, the influenza bacillus.

THE RÔLE OF EPITHELIAL CELL REMNANTS.

While not strictly periapical, the peridental or pericemental abscess, according to D. D. Smith, is a blind retentive infectious area, lying in the peridental membrane attached to teeth with vital pulps. The fact that the pulp is vital, and that these foci are absolutely isolated from bacterial contamination from the oral cavity, excludes the rôle of local infection, and allows an unprejudiced view of the results of infection via the blood from constitutional states or portals of entry elsewhere. Without going into the question as to whether these groups of epithelial cells are glandular or isolated cell rests of the external epithelium of the enamel organ, it has been shown that they have no connection with the mouth. The work of Dr. Black and the recent paper by Dr. Kirk(13), in which he calls attention to the part these areas may play by reason of local lowered resistance in pyorrhea, the report of a case made thirteen years ago by the writer where hematogenic deposits and pus were found in these cell rests associated with recurrent tonsillitis and the rheumatoid diathesis, impresses us with the great importance of their etiology, if for nothing else than to prove that a periapical tissue can be infected via the blood stream. We cannot fail to associate an early study of twenty cases made by Kirk, in which the pneumococcus was isolated uncontaminated from four such pus areas, with the statement by Coplin(14), who says of the pneumococcus: "It is the specific causative agent in many coryzas and catarrhal inflammations of mucous membrane"—for a few cases have occurred in the writer's practice where peridental abscesses follow or are coincident with nose and throat conditions proved to be due to the pneumococcus. A large percentage of such periapical areas resulting in the loss of the vital teeth involved, occurred in patients affected by the "milk" epidemic of two years ago in Baltimore. The portal of entry in this epidemic was the pharyngeal membrane, not necessarily the tonsils, for it was just as virulent in those who had had their tonsils dissected out; the organism is now definitely known to be a streptococcal strain closely allied to, if not itself the pneumococcus.

As exactly the obverse of this modus of periapical infections, you are referred to the paper of Morris, where tooth extraction, *i.e.* the movement of roots covered by pus, had infected the blood stream, producing embolic pneumonia, as confirmed by the writer's case of Miss H., who suffered from a large chronic periapical pus area involving two upper bicuspids, and who, four days after the extraction of these teeth, without anesthesia, developed a pneumonia.

BRIDGE WORK AND THE QUESTION OF DEVITALIZATION.

Bridges have very rightly been condemned because of the necrotic areas re-

sulting in pus foci lying in the peridental membrane of otherwise vital teeth free from fillings shaped to receive gold shells as abutment teeth. These have been associated with the systemic states here recorded by Rhein and others, and by the writer, who believes, judging from the location of these areas in specimens and X-ray and film studies, that they are these same epithelial elements, always of a lowered resistance, further lowered by the escape through the root of the products of a necrotic though not necessarily infected pulp well sealed under a gold cap, or from excessive occlusal stress; and probably they are infected, particularly in the diatheses mentioned, by hematogenous processes, just as in peridental abscess, becoming secondary focal septic areas.

This finally brings up the whole question of pulp devitalization, especially in regard to the construction of bridges, for it is well recognized that a well-adapted bridge abutment cannot be made, and the pulp retained, except occasionally. We have no other recourse than to treat and fill, as far as possible, the septic roots presenting, and, if this treatment fail, ablate the apex or extract, if necessary from a standpoint of health; but the writer has learned to dread the diatheses mentioned (that of arthritism and the toxin habit) in pulp devitalization and any root-work, and while recognizing the difficulty of the bridge question, he is rather inclined to agree with Buckley(15) that too many pulps are needlessly devitalized, particularly under these conditions. There is, then, nothing left but to avoid the bridge in these diatheses, and construct a partial denture. The extravagant, almost reckless attitude of many medical men who have taken an interest in this question is to be deplored; because focal infective areas were found about *some* crowns and bridges, they now look on *all* such with suspicion, create doubt in the mind of the patient, and frequently order them all removed or the teeth extracted. Now, we know that it is not the crown, but the root under it, which is at fault, and it were well if they would learn to discriminate, or at least to consult a dentist.

DISCRIMINATION IN TREATMENT IMPERATIVE.

It has been stated that the apices of many perfectly filled and treated roots, as far as dental knowledge can foresee, become reinfected via the blood stream, and the dentist has frequently been accused when not guilty. The writer wishes it understood that he is not one of those who can fill every root; he does not agree with Dr. Rhein that even fifty per cent. of blind abscesses, in this diathesis, can be really cured. He agrees, however, heartily that the greater proportion of these systemic phases occur as Dr. Rhein(10) has said: "These may be the result in some case of bad judgment of the operator, in others of ignorance and incompetence, but in a large number of cases the condition is due to an educated dentist failing to give the time needed to perform an aseptic operation." He further makes it clear that this hurry is due to fear of offense to the patient by the necessarily high fee which these services entail.

There is, however, another and more serious view of the matter. We have drifted from the axiom that "Every tooth must be saved," to the practice that "Every tooth can be saved." We must admit to the patient and to ourselves that there are roots so tortuous as to preclude the removal of necrotic pulp and permit filling. Why attempt the impossible? Does the surgeon hesitate to amputate for fear of losing prestige, and leave necrotic bone areas? He does a clean operation, for which the patient thanks him even if it involves loss of function and disfigurement. If this be good practice in tissues of high reparative power, why should we hesitate to amputate or extract dental tissues, of a low reparative power, when we have at our command methods of replacement so superior to those of the surgeon?

CONCLUSION.

While too much cannot be said of the gravity of diseases proved to be the result of periapical infection, and while we can never foretell how serious the condition

may prove to be, this is a full report of careful observation extending over more than four years of full practice and while acting as consulting dentist to many medical practitioners, including Dr. William Baer, with a large orthopedic practice. While the writer has seen but one hundred-odd such cases, and they were all multiple, except a very few which were primary periapical areas, no doubt Dr. Gilmer([16]) is correct in his statement that over twenty-five per cent. of all adults have alveolar abscesses in some form. But we do not believe that it necessarily follows that even twenty-five per cent. of this large number will show systemic damage from such abscesses, bad though they may be, and the immunizing powers of the blood and tissues must be recognized.

We cannot close this paper better than by quoting Dr. James B. Herrick([17]) who, in discussing Dr. Mayo's address, said: "It is easy to follow a fashion and jump to the conclusion that practically all of our obscure diseases may be and are due to small foci of infection. There may be, as the result of a fad, a too wholesale cutting-out of tonsils and extracting of teeth. While we should recognize that there is truth in this important lesson as to focal infections, we must not, in an extravagant manner, think that this accounts for all our chronic diseases. It means that in every single case we must individualize."

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

CORRESPONDENCE.

IS IT POSSIBLE TO KEEP "OLD WINE IN A NEW SKIN"?

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The editorial in the November COSMOS will doubtless suit an increasing class of mind, but its tendency throughout is toward illiberalism in dentistry, and, in the opinion of the writer, unworthy of a journal supposed to be in the interest of a broader intellectual life.

Its criticism is evidently directed toward several articles recently published, criticizing the changes made in the constitution of the National Dental Association; but, of these, one seems to have had undue influence on the editorial mind.

It may be that criticism in advance of development in any individual or organization is premature, but in the present instance it is a National body, and, if criticism be not made in advance, later efforts at reform will, in all cases, prove fruitless.

It is useless to hope for non-political activity in such a body organized as at present; indeed, the indications all point to the fact that the future promises a national organization in dentistry altogether governed by political interests. The laws of development are all pointing in that direction, and these are unfailing in logical results.

The present organization is an autocratic association. The freedom of the individual is curtailed by the authority of a few men, who dictate what shall be published and what shall go into the waste-basket. Is this encouraging the younger generation to seek that broader intellectual life most desirable in the growth of a profession?

If the members of the subordinate associations of the National Dental Association expect their productions ever to see the professional public eye, the writer fears that they may suffer disappointment. All writings, however produced, must be subjected to the judgment of a few men whose immature thought and prejudiced opinions may send these, without hope of mercy, to the waste-basket. This is the settled conviction of the writer, intensified by present and past experience.

Your correspondent has been an active worker in national and other associations for many years, and has been more annoyed by the garrulousness of the official debaters than by anything he has ever heard from the benches. The "centralized control of society affairs" can never work to the harmonious development of science in dentistry, or elsewhere; and besides, it is contrary to the spirit that has developed successfully the American idea, which in the nature of things is contrary to old-world methods.

If the National Dental Association should survive the transferrence and placement of the "old wine in a new skin," it will be, if successful, and avoids excessive fermentation, one of the most remarkable transformations on record.

JAMES TRUMAN.

PHILADELPHIA.

Proceedings of Societies.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Annual Meeting at The Hague, August 27, 28, and 29, 1913.

[Report furnished by courtesy of the *British Dental Journal.*]

The International Dental Federation met at The Hague on August 27 and 28, 1913, and at Amsterdam on August 29, 1913. On the evening of August 26th a reception of members and guests was given at the Hotel d'Orange, Scheveningen, by the two dental societies of Holland, when a cordial speech of welcome was delivered by Dr. Coebergh (Utrecht), president of the Dutch Dental Society, with whom was associated Dr. Van der Linde (Zwolle), president of the Society of Dutch Dentists. Mr. W. B. Paterson, the president, made a fitting acknowledgment, and complimented the speaker upon his excellent presentment of the welcome in the official languages of the Federation.

OPENING SESSION.

The opening session took place on Wednesday morning, August 27th, in the hall of the Painters of The Hague, "Pulchri Studio," 15, Lange Voorhout, The Hague. Mr. W. B. Paterson (London), president of the Federation, took the chair, being supported by Dr. C. Godon (Paris), hon. president; Dr. F. Schaeffer-Stuckert (Frankfort), general secretary of the F. D. I.; Dr. E. Rosenthal (Brussels), treasurer; Mr. J. Howard Mummery (London), Dr. R. Weiser (Vienna), M. Francis Jean (Paris), Dr. T. W. Brophy (Chicago), Dr. Florestan Aguilar (Madrid), vice-presidents; Dr. W. Guy (Edinburgh), adjoint secretary; and Dr. C. Van der Hoeven (The Hague).

Those present included Dr. E. Förberg, Dr. J. Wessler, and Mr. Albin Lenhardtson, representing the Swedish Dental Association (Stockholm); Professor E. Jessen and Dr. L. Roth (Strasburg); Dr. A. Scheele (Cassel); Mr. W. Harrison (Brighton), Mr. H. R. F. Brooks (Banbury), Mr. G. O. Whittaker (Manchester), Mr. G. Thomson (London), Mr. A. L. Bostock (Kidderminster), Mr. G. Cunningham (Cambridge), Mr. T. E. Johnson (St. Andrews), Mr. C. E. Page and Mr. J. Morris Stewart (Edinburgh), Mr. C. Lees (Tunbridge Wells), Mr. H. Atkins (London); M. Henri Villain and Dr. N. S. Jenkins (Paris); Professor C. Christensen (Copenhagen), Dr. V. Guerini (Naples); M. Emile Huet, M. Quintin, M. Quarterman and Mlle. Schwarz (Brussels); Dr. A. Oscar Strauss (Milwaukee), Dr. R. H. Riethmüller (Philadelphia), Dr. M. L. Rhein (New York), Dr. Subirana (Madrid), Dr. Neuhaus (The Hague), Dr. Coebergh and Dr. Th. Dentz (Utrecht), Dr. J. S. Bruske, Dr. De Boer and Dr. A. A. H. Hamer (Amsterdam), Dr. Van der Linde (Zwolle), Dr. A. Van Geldere (Zaandam), Mr. G. L. Van der Hoek (Rotterdam), and others.

Welcome from the Dental Societies of Holland.

Dr. Van der Hoeven. In the name of the dental societies of Holland (the Nederlandsch Tandheelkundig Genootschap and Vereeniging van Nederlandsche Tandartsen), it gives me great pleasure to extend a most cordial welcome to the members of the F. D. I. We are proud of the fact that it is the second time that our honored colleagues have come to Holland. On the first occasion the meeting was held in Amsterdam, in 1907, and we all remember with regret that that meeting would have been presided over by our beloved Miller but for his sudden and lamented death. His spirit, however, lived among us in the address on "Dental Education" that he had prepared for the meeting, where it was read. No doubt largely under his influence and authority the fundamental principles for the progress of dental education were laid down at the Amsterdam meeting and accepted next year at the meeting in Brussels. We intended to receive the F. D. I. again this year in Amsterdam, where the accommodation in the University buildings is much better; however, *varietas dilectat,* and as we presumed that you would like to meet in The Hague at the time of the opening of the Palace of Peace, we decided to invite you here. I regret that it is not feasible to obtain an invitation for F. D. I. members to witness the ceremony of the opening, but when I tell you that only 300 high personalities, diplomats, and official delegates are to be present, you will understand why our request could not be granted.

Regarding dental education in Holland, I am glad to be able to inform you that a new bill has been passed, regulating the dental curriculum according to the views of the F. D. I. The instruction in practical dentistry was already well founded, since our esteemed *confrère* Grevers, continuing the work of Dr. Dentz, was appointed director of the Dental Institute at Utrecht, and assembled around him a staff of able teachers in conservative dentistry and orthodontia. According to the new law, there will now be established at the University of Utrecht a special course in the auxiliary branches of the science of dentistry (anatomy, physiology, pathology, histology, surgery, materia medica and therapeutics), as well as in the special theoretical part of dental science.

The President (Mr. Paterson) thanked Dr. Van der Hoeven and the members of the dental societies of Holland on behalf of the Federation, and then delivered the following address:

President's Address.

Ladies and Gentlemen,—In coming to The Hague at a moment when celebrations in honor of the opening of the World's Palace of Peace are in active progress, the International Dental Federation realizes in the highest degree the value and importance of internationalism in the spread and increase of human knowledge, and its relation to the peaceful settlement of worldly affairs. We, who are members of a profession practicing a small but important branch of the science and art of medicine, come to this new center of the world's intellectual activities with no serious differences to compose. There is no *status belli* in our professional world, nor even dissension in our ranks. We come to this city from various countries for the purpose of an interchange of thoughts upon questions of interest to our Federation, and for a consideration of matters affecting the forthcoming International Dental Congress to be held in London in 1914. Our business is not simply personal or limited to the dental profession, but has an ultimate significance and bearing upon the welfare of mankind.

Some explanation is due from me to the Federation for the reason of our visit to The Hague. As many of you know, it was decided last year at Stockholm to accept the invitation from the National Dental Association of America, so cordially conveyed to us by Dr. Brophy, to meet in America this year. Events, however, have occurred since to prevent the carrying out of that laudable project. In the first place the F. D. I. did not wish to meet in too remote a place, and to that end expressed a hope that some city on the Atlantic seaboard of America

might be chosen. Dr. Aguilar, who visited the meeting of the National Dental Association in Washington last September as our delegate, found upon his arrival that Kansas City, Mo., had been selected by that association for its next meeting; and he, knowing our wishes, and our desire to meet in the same city, if possible, as the National Association, explained the situation to our intending hosts, with the result that an amicable understanding was arrived at, and the F. D. I. was released from its pledge to visit America this year. As Holland and Spain had both invited us, and our voting had shown a slight preponderance in favor of the former, it was decided to accept the invitation to visit The Hague. Hence our presence here today.

I think you will admit, in view of the opening of the Palace of Peace, that we have come to a convenient world's center for international meetings, and also that we have received a very cordial reception at the hands of our Dutch colleagues. I offer to them on your behalf, gentlemen, our grateful thanks for their fraternal greetings and kindly welcome; and I express to them our lively sense of pleasure in what we have already experienced, as also our joyous anticipation of further pleasure to come.

At Stockholm I made the suggestion that the Council of the F. D. I. might consult together for the purpose of arousing an enthusiasm among the leaders of the dental profession in various countries, to concentrate their thoughts and energies upon the International Dental Congress which is to meet in London in the first week of August of next year. You appointed me and my colleagues, who represent the British Dental Association in the F. D. I., to act as your delegates to the Committee of Organization of that congress. At the proper time we shall present a report of our work on that committee, and it is upon that report that I hope you may be induced to give your valued help in the direction of my suggestion.

In connection with the congress, I may be permitted in the meantime to make two announcements which I hope will afford you pleasure. My first is that his Majesty King George of England has graciously consented to become the patron of the Sixth International Dental Congress. Former international dental congresses have met under the favorable auspices of government patronage, but we have never before received the signal honor of the personal patronage of the monarch or president of the country in which a congress has met. We may expect, therefore, that this recognition of our claims to national recognition as a learned and scientific body will be repeated on all future occasions of congress meetings. I have to announce in the second place that the British Secretary of State for Foreign Affairs has consented to invite the governments of all countries represented in the Federation to appoint official delegates to the International Dental Congress; and the invitations have already been issued by him and have been delivered to the secretaries of state for foreign affairs of the several countries.

I will now refer to other happenings since our last meeting in Stockholm. And in the first place, it is with sincere regret that I mention the loss by death of one of our oldest colleagues, and one who assisted at the foundation of the F. D. I. Victor Haderup will long be remembered by those who had the pleasure of his acquaintance and friendship, as an indefatigable worker in all matters that concerned the honor and welfare of his profession, as a loyal comrade and a kindhearted man. Those of the F. D. I. who were present in Copenhagen in 1902 will recall with pleasurable emotion the cordiality of his welcome and the generous nature of his hospitality. His failing health was known to us for some long time past. His work in public dental hygiene, however, was not allowed to languish for lack of enthusiastic support, and Denmark today may well be proud of her position in regard to public health. Of the man, it only remains for us to say, *Requiescat in pace.*

Speaking of public dental hygiene reminds me that I have asked Professor Jessen to represent the F. D. I. at the opening ceremony of the Forsyth Den-

tal Infirmary in Boston, U. S. A., next autumn, and he has consented to act. In representing us on that occasion Professor Jessen will find himself assisting in the completion of a great work of private munificence founded in the interests of the public and the state, a work which his great experience of public dental clinics in Germany and elsewhere will enable him to comprehend to the minutest detail. We shall welcome a description of his experiences at some future time.

The World's Congress of International Associations was held this year in Brussels, and we are obliged to Mons. Huet for officially representing us on that occasion. Mons. Huet's knowledge of bibliographical questions eminently fitted him to take part in such a congress, and later on he will doubtless give us the impressions of his visit.

In April of this year I received, as your president, a cordial invitation to attend the jubilee anniversary of the Zahnärztlicher Verein at Frankfort-on-Main under the honored presidency of our general secretary, Dr. Schaeffer-Stuckert. It was with regret that I was prevented by other duties from attending that interesting event, but I felt assured that no better official representative of the F. D. I. could be found than our highly esteemed colleague himself, who presided, as I am informed, with great *éclat* on that occasion.

I must mention two social events of the year which have an interest to the F. D. I. I refer to the banquets of honor given to Dr. Brophy in Chicago, and Dr. Godon in Paris. At both those interesting functions I am pleased to say that the F. D. I. was represented by word and deed, and I am happy in the belief that the honors accorded to our esteemed colleagues were worthy of the occasions.

I do not propose to include in my brief summary of events any account of the work of the Commissions on Hygiene, Education, and Bibliography, as their activities will be more fitly dealt with in the addresses of the presidents of those commissions.

This meeting of the F. D. I. is the last but one before the congress. In August 1914 we resign our offices, and the third quinquennial period of our existence, as the International Dental Federation, or Permanent Bureau of Congresses, comes to an end. It is necessary, therefore, that we should survey our position and see to the orderly arrangement of our affairs previous to making our final report to the congress. Among the matters that we must consider between now and then are the following:

(1) Such alterations of our rules and regulations as may be thought advisable in the future.

(2) The preparation of the final reports upon the subjects considered by the various commissions during the quinquennium (1909-14).

(3) The third award of the Miller prize to be made in 1914. I must ask the members of the Federation to give sufficient prominence to the announcement of this award in the journals of their societies and other official or professional organs of the countries to which they belong.

(4) At our last meeting we shall have to consider such invitations as we may receive for the congress which shall succeed that of London, and we must come to a decision to be reported at the closing meeting of next year's congress.

It will be apparent, therefore, that we have important subjects requiring our earnest attention between now and August 3, 1914, which I suggest to you as the date for our next meeting.

While on the subject of meetings I may mention that I have received an official invitation from the committee of organization of the Panama-Pacific Dental Congress, which is to be held in San Francisco during the time of the Panama Exposition in celebration of the opening of the Canal, viz, on the last Monday of August 1915 and ten following days. This congress is not in an official sense an international dental congress, nevertheless it will attract professional men from all parts of the world, and will have the advantage of the attendance of members of the National Dental Association of America at their annual meeting fixed to take place there.

Beyond expressing my personal willingness to assist the committee, as my humble powers will permit, I have not yet made an official answer on behalf of the F. D. I.

In conclusion, gentlemen, I have to thank you for your attendance at this meeting, as well as for your attention to my remarks. I trust that we may continue to work together to the end of our period of office in that spirit of good fellowship which has so pleasantly characterized our proceedings in the past.

The President announced that he had received telegrams and letters regretting absence from Professor Walkhoff (Munich), Dr. Kirk (Philadelphia), M. Blatter (Paris), Messrs. Weber, Aspelund, Siven, and Gadd (of Finland), Daubry (St. Petersburg), Dr. Dubeau (Montreal), and W. Fisk (Watford). He then, according to custom, called upon the delegates of the various national committees in French alphabetical order of their respective nationalities to address the assembly.

Dr. F. Schaeffer-Stuckert (Frankfort-on-Main). In the name of the Central-Verein of German dentists, and also of the whole dental profession in Germany, I should like to express the best wishes for the success of this year's meeting of the F. D. I. We take particular interest in the consideration of the arrangements for the Sixth International Dental Congress in London. The aim of our proceedings must certainly be to see that this congress shall mark a new step forward and upward in the continuous development and growth of dentistry. I must especially express satisfaction that we are meeting in The Hague, the center *par excellence* for congresses. Our heartiest thanks are due to our colleague, Dr. Van der Hoeven, and the Dutch dental societies for their kind welcome and hospitality, which recalls happy memories of Amsterdam in 1907. I have to excuse the absence of my friend, Prof. Dr. O. Walkhoff, who is prevented by the sudden illness of his wife from coming here, and who asks me to convey his best greetings to all. Honored colleagues, we are meeting in the center of international peace and amity, and we are engaged in furthering a great task; let us embark upon our enterprise in the same spirit, so that the Sixth Internationl Congress shall recall to us the motto, *In hoc signo vinces.*

Mr. J. Howard Mummery (London) offered hearty greetings on behalf of the British delegates, and especially acknowledged the kindness of their Dutch hosts. He said: We are meeting in a city justly celebrated for its efforts in the cause of international peace, which, I am sure, has the hearty sympathy of all. Though there are still wars and rumors of wars, nothing tends to bring about the much-desired end more than such international meetings as this. This gathering is of special interest inasmuch as we are engaged in organizing the next International Dental Congress in 1914, when we shall have the pleasure of welcoming in London our colleagues from all parts of the world. I feel sure that members of the F. D. I. will use every endeavor to render the congress a memorable one, which will be prolific in good results for the benefit of our profession and the world generally.

Dr. T. W. Brophy, Chicago. As representing the profession in America, I am very happy in finding it possible to be here, and I wish to convey to you greetings from the National Dental Association of the United States and the profession generally. I am glad to say that the seed which the distinguished dentist who first became active in the work of public oral hygiene had sown at Strasburg, has become deeply rooted in America and is now bearing good fruit. The great International School Hygiene Congress now being held at Buffalo, U. S. A., is going to focus public attention on the question. The spirit which prompted the Peace Congress at The Hague has, I think, pervaded the minds of our profession everywhere. This spirit of unison and good-fellowship will find its practical expression in the congress of 1914, and must, more than any other factor, insure its success as well as render its achievements such as will make every member of the profession

proud that he belongs to it. I say with all my heart that all America joins in the work of the F. D. I., and the feeling which once existed about the outcome of the F. D. I. has passed away. We can truly say that every thinking member of the profession in America, engaged in dental teaching or literature, is in full accord with its work.

Dr. R. Weiser, Vienna. I am empowered by the Central-Verband der Osterreichischen Stomatologen to offer you their most respectful greetings. I, for my part, should not like to let the present opportunity pass without duly expressing my delight and gratitude for the most cordial and munificent hopitality of the Dutch dental societies. The F. D. I. meets this year in the country renowned for a successful alliance of nature, art, and universal humanity, destined to render life more happy and peaceful for mankind. May this meeting of the F. D. I. succeed in taking a notable step forward for dentistry, which is continually developing in science, so that it may also occupy its due social position. May it likewise succeed in speedily putting an end to all want of harmony between different sections of dentists.

Dr. E. Rosenthal, Brussels, offered congratulations and thanks to their Dutch colleagues. In previous years he had expressed the conviction that the position of dentistry in Belgium constituted a public danger, and that the organization of dental teaching was absolutely essential. He was now happy to announce that the situation had been completely transformed, and, thanks to the encouragement and guidance of the F. D. I., together with the generous cooperation of leading Belgian dentists, the Belgian Dental School had been founded in Brussels. The foundation of the new dental school was a testimony to the energy and perseverance of the National Belgian Federation, and he was confident that it would flourish under its able director, M. Quintin, and its zealous committee of management. Though Belgium was only a small country, they could now look forward with confidence to the future of dentistry there, and they hoped still to have the interest of the F. D. I. in their welfare.

Prof. C. Christensen, Copenhagen. I bring most hearty greetings from Denmark, and desire to offer my best thanks for the kind welcome given by the Dutch dental societies. Of special interest to us is the work of the Hygiene Commission, that most valuable branch of the F. D. I. This is going to be very successful in Denmark, and our king, who is Protector of the Society for the Care of Children's Teeth, has personally asked me to bring his greetings to the President of the Hygiene Commission, Dr. Jessen. That is a proof that this work of the F. D. I. occupies a very prominent place in our country. I beg to express my most cordial wishes for the success of this meeting and of the International Dental Congress next year.

M. Henri Villain, Paris. In the name of the French National Dental Federation, a sister of the F. D. I., as it saw the light in the same year at Paris (1900) and under the same conditions, I bring you cordial greetings from my French colleagues. This agreeable duty belonged to the president of our federation, my friend M. Blatter, but we much regret his absence owing to illness of relatives. I likewise rejoice with my countrymen in the thirteenth year of the existence of the F. D. I., whose useful activities we are glad to see flourish and extend every year. Thanks to the F. D. I. the evolution of dentistry is proceeding more regularly and normally; we see progress and development under its protectorship and control, together with the support and promotion of all good work. In matters of education and hygiene, this undeniable action has produced the happiest results. Its influence has made itself felt, by degrees, upon professional organizations, of which it has become, to some extent, the regulator. It has attracted and compelled the attention of public authorities by bringing forward carefully thought-out proposals and programs. It has won, little by little, powerful support, and added to its professional family an extra-professional

family, which is likely to render valuable assistance. Do not our international dental congresses emanate from the F. D. I.? Without wishing to make ourselves a year older, I may perhaps be permitted to anticipate the immense success which the London Congress will certainly have next year; how could it be otherwise with the eminent organizers in charge? In spite of their great modesty, we may already thank the two principal personalities—Mr. Mummery, the president-elect of the congress, and our devoted president of the F. D. I., Mr. Paterson, who is president of the Committee of Organization. I also bring the greetings of French dentists to our dental colleagues, who offer us hospitality for the second time; and I offer a tribute of admiration to The Hague, the center of international meetings and site of a tribunal of arbitration, which holds in its hands to some degree the fate of nations, and is also a court of justice too often forgotten by nations in their differences. This elegant city now contains the Palace of Peace, the embodiment of the world's dream of universal peace—that, alas! is so difficult of realization. If this happy day has not yet dawned, meetings like that of the F. D. I., in which twenty different nations are represented, must certainly contribute to drawing closer the bonds of fraternity and hastening the day when all nations shall cease to make war.

Dr. V. Guerini, Naples, brought greetings from all colleagues in Italy. He said: A notable event concerning our specialty in Italy this year has been the putting into operation of the dental law as regards the so-called "sanatoria," or, as it may be described, the act of indulgence permitting irregular practitioners, under certain conditions, to regularize their position. The law provided that irregular dentists who had practiced personally and publicly for eight years at least would be admitted to an examination, on passing which they would be qualified to continue practice. Those who had practiced irregularly for fifteen years at least might obtain the same recognition on presenting documents attesting their practical competence. The applications made to the commission specially appointed numbered about 1000, and most of them were granted. The examinations were held in almost every university in Italy. The examiners were professors of stomatology and general surgery, and one was surprised by the remarkable fact that, while the stomatologists fought strongly against any recognition for these irregular practitioners, those who were examiners were much more indulgent than the professors of general surgery, who often put to the candidates some difficult and hardly suitable questions. The result of such indulgence by the stomatologists was that two-thirds and perhaps more of the candidates passed, thus becoming legally authorized dentists. In certain universities all the candidates were approved. However, seeing that henceforth severe measures will be taken against illegal practice, one can consider that dental quackery is now abolished in Italy.

Dr. F. Aguilar, Madrid. It is a great pleasure to revisit Holland, and Dr. Subirana and myself bring greetings from Spain. I can report great progress since last year in our country. Lately we have succeeded in establishing a dental service in the Spanish army, the whole of which will receive the benefit of dental treatment. We have further succeeded in obtaining a ministerial decree creating dental inspectors in every province to enforce the sanitary law in respect of illegitimate practice. Nobody will be permitted to practice without a degree. Next, our dental teaching will be improved, and a new chair created in the dental department of the medical school at Madrid. We have today five professors and three assistants, all paid by the state, which provides all expenses of dental teaching in the medical school. We have tried to achieve these reforms in the spirit of altruism and for the advancement of the profession, and we come here full of good-will and gratitude to the F. D. I.

Mr. Albin Lenhardtson, Stockholm. As representing the Swedish Dental As-

sociation, I bring hearty greetings. As you know, there has been a certain opposition to the F. D. I., not only among stomatologists, but also among dentists themselves. I do not reproach them with that, for it is characteristic of human beings to oppose what they do not understand, and it is the same with all movements for the benefit of humanity. Time will change this, and misunderstandings are disappearing. As one specially interested in the oral hygiene movement, I feel we must face this important question: Are we dentists generally, and members of the F. D. I. especially, able and prepared to respond to the claims which public authorities have the right to make upon us? We have started the stone rolling; are we able to direct its course? We are responsible not only for the generation of today, but also for coming generations. While the foundations of the mouth hygiene movement are being laid, faults can now be easily corrected, but in a few years, when methods and principles have become established, and perhaps confirmed by public authorities, it will be much more difficult to set things right. I think this point of view should be borne in mind, and I wish to emphasize the responsible task of the F. D. I.

Dr. JESSEN, president of the Hygiene Commission, said: During this week, from August 25th to 30th, the Fourth International Congress for School Hygiene has assembled in Buffalo in the U. S. A., thousands of men of science from all the civilized countries of the world, who are to deliberate on the welfare of the young and their advancement at school. Official representatives of all countries and of numerous towns have met there to learn what experience has taught in school hygiene during the last three years, since the Paris Congress, from scholars, medical men, technicists, and public functionaries. Considering the lively activity being displayed everywhere in the domain of school hygiene, these experiences are by no means to be undervalued. The members of the congress will take new suggestions back to their homes, and make the best of them in their community at large, so that the rising generation may prosper and expect a bright future owing to its health and strength. Three hundred lectures are to be delivered by speakers from all parts of the world. This is the good result of an organization on a grand scale called into existence for the preparation of this congress by the forty-five committees in the U. S. A., together with thirty-three committees abroad.

The colleagues of our own profession are not wanting, either, at this universal congress, for the National Association for Dental Hygiene in America has established a central committee with fifty-one state committees, entirely for the purpose of working together with the Fourth International Congress for School Hygiene. At the head of this association is Dr. Ebersole, of Cleveland, Ohio, who is at the same time vice-presient of the congress. From this prominent position of our profession in an International Congress for School Hygiene one may realize that the question of public hygiene of the mouth has made progress since the congresses in Nürnberg, London, and Paris. At Buffalo there will be organized a committee, which will henceforth make dental hygiene an integral part of the discussions during the International Congress for School Hygiene. The Hygiene Commission of the F. D. I. will also assist in the execution of the task. There have also been lectures announced, and proposals made at Buffalo by our members for a further international extension of hygiene in schools.

In the past year our commission has been busily working. New national committees and new associations are being established, and those existing thus far have been further organized and developed. In Sweden a royal commission has been appointed for centralizing the organization of dental hygiene. In London twelve dental clinics for school children are in operation, and the number will be increased to twenty by the end of this year. In November, at Boston, the opening will take place of the Forsyth Dental Infirmary for Children, founded with a capital of

$3,000,000 for the gratuitous treatment of about 100,000 children. In Germany there are now, according to the statistics of the German central committee, 84 infirmaries and 117 places for treatment of children's teeth—that is to say, in all, 201 in full working order. Dental hygiene in country districts is not yet taken into consideration in the statistics, but the administration is making every effort to introduce dental hygiene for children in all the rural districts, with the help of its administrative head offices and the medical officers of the districts. These measures testify to the importance of our efforts for the prevention of infectious diseases, the struggle carried on against consumption, and the improvement of public health. It remains our task to aid in carrying farther these advances, and to introduce them into all countries, so that dental surgery may not only be internationally acknowledged as a science, but also as an essential branch of practical social care and hygiene.

M. Huet, president of the Commmission of Bibliography, said: The path which the Commission of Bibliography and Documentation of the F. D. I. has to follow seems strewn with many obstacles when one comes to examine the work accomplished at the end of the year. At first sight it does not appear very brilliant, and one might be tempted to ask if bibliography and documentation will ever arouse sufficient interest in the professional world to occupy a fitting place in a world Federation like ours. This task is indeed barren and ungrateful; it offers no substantial advantages to him who undertakes it—all he can anticipate is the moral satisfaction of having contributed his stone to the edifice, and of having worked for the general good and the advancement of the profession. You all know how important is this department in dental science. Of course, I speak here to those already convinced, but if all here appreciate the necessity for a perfect organization in bibliography and documentation, have we done all we could to interest the whole profession in this question? And if the results are not quite what they should be, are we not responsible? When we see many branches of science resolutely forming a perfect organization for this purpose, must we not recognize that dental science is rather slow in coming into line? And yet, in other branches of our science, often, we can say boldly that we are advancing with a rapidity greater than in many other scientific domains.

There is, then, a certain inertia to overcome, a current to set in motion, and it behooves us to yoke ourselves energetically to the task. The means are within our reach. We must make all dentists of every country understand that they have certain duties to perform toward society and the profession, each according to his aptitude and his aspirations. Certainly, by co-operating in the collection of materials indispensable for forming a powerful documentary organization we shall make a useful contribution to an international dental undertaking. Let us go to the source, and inculcate in our *confrères* and our students this idea of working for such an object and thus collaborating with the commission. This organization must progress and not remain merely a plan; dentistry should show that it realizes its true interests and that it is ready to enable all its practitioners to participate fully in the treasures of dental knowledge accumulated in the different parts of the world.

If I make this appeal, it is because much apathy has to be overcome; we have often knocked without obtaining any response. Nevertheless, certain results have been achieved; we have collected and condensed many documents, as stated in the report to be presented to the commission, and I thank all who have co-operated. The Second Congress of International Associations, at which I represented the F. D. I., opened fresh horizons, and many useful resolutions were passed. A statement on this point is given in the report, together with the program which the commission proposes to carry into effect this year with the collaboration we hope for from members of the profession. We shall come

to our task with fresh energy, realizing its enormous service in the future to our profession. It is no longer possible for a dentist to keep himself *au courant* with all the questions which concern his profession; he needs a documentation which will provide him quickly with information on those in which he is interested. It is an undertaking of general interest, the advantages of which have already made themselves felt, and which will become more and more indispensable to the progress of dental science.

Telegrams.

On the proposition of Dr. Aguilar it was agreed to send a cablegram of greeting and good wishes to the International School Hygiene Congress at Buffalo.

Telegrams were also sent to the Queen Mother of Holland, the King of Denmark, and the King of Sweden, expressing gratitude for, and appreciation of their majesties' patronage of the dental hygiene movement.

At the conclusion of the opening session a photograph of the members and the ladies accompanying them was taken by Mr. Vermeulen of The Hague.

EXECUTIVE COUNCIL.

FOLLOWING the opening session on August 27th, the Executive Council met, Mr. W. B. Paterson, president, in the chair.

The PRESIDENT announced that they had received with regret the resignation of Mr. G. G. Campion as one of the British Dental Association delegates; Mr. H. R. F. Brooks had been appointed as Mr. Campion's successor.

New Members.

The following were elected members: Dr. E. J. Counter of Adelaide, South Australia, president-elect of the fourth Australian Dental Congress (Adelaide, 1913); Dr. E. T. White of Brisbane, Queensland, president of the third Australian Dental Congress (Brisbane, 1912); Dr. John Wessler, head of Stockholm's municipal dental clinic and editor of *Odontologisk Tidskrift;* Dr. Ferdinand Baden of Altona, and Dr. W. B. Witt of Darmstadt.

Applications from the Sveriges Tandläkare-Förbund (Swedish Dental Society) through Dr. Dahlen, president, and F. Nordstrom, secretary, and from the Finland Dental Society through Dr. Gunnar Siven, secretary, for affiliation to the F. D. I., were accepted.

Report of the Treasurer.

Dr. ROSENTHAL submitted the financial statement for the year, which was referred to Dr. Aguilar and Mr. Walter Harrison for audit.

Report of the Secretary-general.

Dr. SCHAEFFER-STUCKERT said that his report would be brief, as a great deal of the work of the general secretary had been done by Mr. Paterson. Action had been taken by the Bibliographical Commission to form a collection of dental directories and registers and to obtain information as to the membership and constitution of all dental societies. He had issued a list of questions in accordance with Professor Walkhoff's resolution at Stockholm, for ascertaining the number of qualified dentists and unqualified practitioners in all countries, but he had not yet received all the replies. He hoped to publish the information in the Transactions. According to the resolution of the Hygiene Commission, Professor Walkhoff's book on dental hygiene had been recommended to all national committees. As to the official recognition of the F. D. I. by governments, the German Government sent information concerning the 1909 Congress to all countries, but omitted to ask for official delegates. The result was that only certain countries were officially represented. He was glad to know that an advance had been made in securing official recognition for the London Congress. The International Medical Congress would be held in Munich in 1916, and he hoped the German National Committee would have some success in improving the conditions of membership as far as dentists were concerned. He believed that Professor Waldeyer would support this.

The Panama-Pacific Dental Congress, 1915.

The PRESIDENT read a communication he had received from the organizers of the Panama-Pacific Dental Congress and said he had pointed out to them that it was not an "International Dental Congress" and the title "international" had since been dropped.

Dr. BROPHY said there was a feeling that the National Dental Association of the United States should meet in San Francisco in 1915, and Americans hoped that the F. D. I. would meet there at the same time. He thought it would be very gratifying to the organizers of the Panama-Pacific Congress if the F. D. I., though unable to recognize it officially as an International Dental Congress, would yet approve of it as a great and important movement in advancing the welfare of the profession.

Dr. RIETHMÜLLER said that already much enthusiasm had been aroused in America for the Panama-Pacific Congress, and the organizers were most anxious to have everything in first-class order. No doubt the attendance would be a record one, and arrangements would be made for reduced traveling rates. There was also a great deal of expectancy that the F. D. I. would meet at San Francisco, and they would receive a most cordial welcome.

Dr. AGUILAR agreed that it was impossible to recognize it as an International Congress, as it did not comply with the conditions of Article 16. He had attended the Washington meeting of the National Dental Association of the United States, and it was then practically understood that the F. D. I. would meet in America in 1915. After all, Americans had a perfect right to ask this, and the F. D. I. could not expect that the dental profession in America, which had 40,000 members—perhaps half the number of dentists in the world—would be satisfied unless the F. D. I. went there. They might recommend this in London next year.

Dr. SCHAEFFER-STUCKERT said he was glad to know from Dr. Brophy that it was not the intention of their American *confrères* to convey the idea that the Panama-Pacific event would be the seventh International Dental Congress. It was not necessary to have a national committee in each country for the San Francisco meeting, as it might create confusion with the London Congress, but members of the F. D. I. could assist individually.

Dr. GODON said he thought the situation was not clear, and the Executive Council should take up a definite position in the matter, in order to *régler les rapports* between the F. D. I. and the San Francisco meeting.

The PRESIDENT said this might be done in London at the congress. He had endeavored to make the position quite clear to Dr. A. M. Flood, the secretary of the Panama Congress, and had asked him to avoid the use of the term "international."

Dr. BROPHY agreed that in making any communication through the F. D. I., it must be made quite clear that the San Francisco Congress was not the Seventh International Dental Congress. He thought, however, that the F. D. I. could accept an invitation to meet there.

Dr. GUY said the question was how far they had power, at that meeting as a Council, which would expire next year, to commit the F. D. I. to definite acceptance of an invitation which had not yet been officially extended to them. While he thought the American Association had every right to expect (and it would be their duty to rise to the occasion and fulfil that expectation), that the F. D. I. should, if possible, meet in conjunction with the Panama-Pacific Congress, yet he did not consider it was in the power of that session of the F. D. I. to accept officially any invitation. Further, he thought that all they should do at the present juncture was to ask Dr. Schaeffer-Stuckert to write to the secretary of the Panama-Pacific Dental Congress, congratulating the organizers upon their enterprise and industry, and wishing them every possible success. They might, perhaps, express the further hope that, at the next meeting of the F. D. I. in connection with the International Dental Congress in London, it might be found practicable and desirable to ar-

range for the F. D. I. to meet in San Francisco in 1915. This would meet the wishes of American colleagues, and, while practically committing the F. D. I. to accepting an official invitation when it came, it would not involve any breach of their regulations. He moved a resolution accordingly.

Dr. GODON seconded, and it was agreed to.

The PRESIDENT remarked that Dr. Riethmüller had mentioned the possibility of reduced traveling rates. If some definite information could be given on that point, it might greatly influence the F. D. I. in going as a body to America.

Dr. RIETHMÜLLER said he believed the rates would be reduced to a great extent, and no doubt the National Dental Association, U. S. A., would try and arrange as cheap accommodation as possible.

The Council then adjourned.

The International Dental Congress of 1914.

The Executive Council met again in the afternoon of August 27th, when the agenda comprised "Consideration of arrangements for the International Dental Congress, August 3-8, 1914, upon report of the F. D. I. delegates appointed to the Committee of Organization of that congress."

The PRESIDENT called upon Dr. Guy to make a statement for the Committee of Organization.

Dr. GUY said that the committee had already done much in deciding upon the rules of the congress and in making preliminary arrangements. The work of the congress would be distributed among ten sections, each of which would have a president, vice-president, and secretaries (who would form the council of the section). Each section had been invited to select subjects for report, and three morning sessions would be devoted to the consideration of these reports. In asking for a report from an individual dentist, the section was desired to select, if possible, the most eminent man—or, at any rate, a man of outstanding knowledge—in respect of that particular subject on which he was to report. In addition, men who were known as authorities on certain subjects would be asked to contribute to the proceedings or the discussions. It was expected that a report would embody the most recent and up-to-date state of knowledge or practice in a particular subject, and that the speakers who followed the reporter would make further contributions to knowledge, based upon their own special research or experience. The committee did not desire to have a speculative position taken up in any report, or to have a subject selected that might excite heated controversy. Matters for controversy or research should be left to be dealt with by papers. The committee hoped to have in each section a definite *résumé* of the existing state of knowledge on a variety of questions and subjects in the year 1914, and these would be recorded in the congress Transactions. To the members of the F. D. I. he would say: We have selected certain subjects, and we are anxious to secure the services of eminent savants as reporters, irrespective entirely of nationality. We do not wish that the British nation should in any sense monopolize the reports. On certain subjects, however, it may happen that the first reporter will be British. It has been considered advisable that, where the president of the section is an acknowledged authority on a subject, he should himself submit the report, but in most cases we desire to have associated with him a reporter of some other nationality. We wish to conduct this part of the work of the congress in such a manner that we may secure the very best and most authoritative reporters who exist in dental science. The committee also decided that every country represented in the F. D. I. should be invited to nominate hon. presidents of sections in the congress, and we want your help in this as well as in selecting reporters on various subjects. We come here only for advice. The sections, acting with the Committee of Organization, will appoint; but we shall be grateful for advice and suggestions.

(To be continued.)

NATIONAL DENTAL ASSOCIATION.

Seventeenth Annual Meeting, held at Kansas City, Mo., July 8 to 11, 1913.

(Continued from vol. lv, page 1269.)

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—J. P. BUCKLEY, Chicago, Ill.
Vice-chairman—C. V. VIGNES, New Orleans, La.
Secretary—LEUMAN WAUGH, Buffalo, N. Y.

TUESDAY—*First Session.*

The first meeting of Section III was called to order by the chairman, Dr. J. P. Buckley, Chicago, Ill., on Tuesday evening, July 8, 1913, at 8 o'clock.

The first order of business as announced by the chairman was the reading of a paper by Dr. BURTON LEE THORPE, St. Louis, Mo., entitled "Prophylaxis."

[This paper is printed in full at page 45 of the present issue of the COSMOS.]

Discussion.

Dr. J. V. CONZETT, Dubuque, Iowa. Dr. Thorpe is versatile: not only is he an authority upon secular history, but his address tonight shows him to be as familiar with holy writ. The only text that I know of which would be applicable here is one used in Job, where he said, "I have escaped by the skin of my teeth," and so I think that, if I get through this discussion and shall have escaped by the skin of my teeth, I will be fortunate.

As we learn the value of the teeth and teach the relation of good teeth and healthy mouths to general health, the public will appreciate more largely the necessity for cleanliness in the oral cavity. We know today that a perfectly clean tooth will not decay, since it is necessary, according to the researches of Kirk, Black, and Williams, for the plaque to be deposited upon some surface of the tooth before there can be decay, and if the plaque cannot be so deposited, the teeth will not decay. The teeth can be kept clean, we know—but not surgically clean. They are kept clean naturally by the proper chewing of the food and the movements of the tongue, lips, and cheeks. The great reason why teeth are lost today, and the great reason for so much pyorrhea, is that we do not properly use the teeth. If we ate proper foods and used the teeth properly in masticating those foods, the attrition and friction of the bolus as it passes over the teeth would keep them in such condition as to render very rarely necessary the use of any of the prophylactic agents we employ today.

I will touch on only one or two of the essayist's items which I consider most important. I do not concur with him in the use of a gritty powder. I know that such a powder can be used without injuring the teeth if properly applied, but it is dangerous to put a tooth-powder of that kind in the hands of the public and let them use it indiscriminately.

Not a great while ago a gentleman presented himself to me with a case of

so-called erosion. I found that he was using a gritty powder; he was right-handed, and the erosion was confined entirely to the left side. In a number of cases I have observed deep grooves cut into the substance of the teeth upon the left side, by the vigorous use of the tooth-brush with a gritty powder, the abrasions being located upon the left side because the patient was right-handed. Dr. Marsh has demonstrated the fact that we can use pumice-stone without injuring the teeth, and in evidence thereof he showed me his own teeth, which were in splendid condition, but he uses the tooth-brush and the tooth-powder properly; he brushes the upper teeth down and the lower teeth up, and does not use the brush across the teeth. Abrasive tooth-powders used in that way do no harm, but if used improperly I believe they will in time not only injure the delicate septal tissue, but also the teeth; the gums will be brushed away from the cementum, and then grooves will be cut in the cementum and dentin.

Dr. Thorpe has said that we must have the co-operation of the patient; and that is absolutely true. We cannot keep a patient's teeth clean unless he employs an intelligent method of keeping them clean after he leaves the office. I took one of my patients to task some time ago because his mouth was always filthy, and scolded him because he was not using proper methods of keeping his teeth clean. His comment was, "What is the use? I am paying you to do that." I cannot keep a patient's teeth clean; it is absolutely impossible unless I am able to have people come to my office two or three times a day. This patient does not brush his teeth properly; he does not chew his food properly; he eats soft food, the remains of which lie about the teeth—and the result is that his mouth is in a filthy condition all the time. We frequently find that when we have done our best to get a patient's teeth in proper condition, and have cautioned him about the care of the teeth, he will lapse into the old filthy methods, and when he returns to us he will show plaques on many teeth. So, unless we can lay down precept upon precept, line upon line, here a little and there a little, daily preaching this doctrine of oral cleanliness in the home, the school, and everywhere, we dentists cannot inculcate these thoughts into the hearts and lives of our patients. Papers and meetings of this sort stimulate us not to become tired of preaching to our patients the proper and thorough use of the tooth-brush and dentifrices.

Dr. Black demonstrated several years ago a method of cleansing the gingival margins of the teeth by the use of a strong spray from a bulb syringe, and I have used that procedure ever since. He uses a common chip-blower, fills it with warm water, and, running the nozzle around the gingival margins, forces the water underneath the gingival margins and into the interproximal spaces. The patient can do this himself after a little instruction. This mode of procedure is especially valuable for him if he has bridge work, because he can keep the bridge work and the interproximal spaces cleaner than in any other way. Another method which will accomplish practically the same result consists in filling the mouth with water, holding the lips together and with the muscles of the cheeks forcing the water into the interproximal spaces. If this be done at frequent intervals, the condition of the mouth will be improved very much. In pyorrhea also it is necessary for the patient to take care of the teeth after treatment. Recently I had two patients come to me who had been in the hands of two of the best practitioners in the country. They said that they had been treated by these men and discharged, and I asked them how long ago these dentists had seen their mouths, and they said it was six years ago. I asked if they had done anything since, and they answered, No. They thought they had been cured and had done nothing since. If these patients had gone back to the dentists at frequent intervals, and had themselves cared for their teeth properly between times, they would never have had a recurrence of the disease. It is therefore necessary that we should impress on our patients the im-

portance of their co-operation, and not have them go away and forget what we have said, and then come back in a year or two with conditions almost as bad as they were originally.

I believe in massage of the gums, and think Dr. Thorpe has given us some splendid ideas in this regard. In this connection I would mention a little instrument designed some years ago by Dr. Alexander for vibratory massage which I have used with a great deal of satisfaction. This instrument is very agreeable to the patient, and, I believe, does a great deal of good when used daily after prophylactic and pyorrhea treatment.

Dr. JULES J. SARRAZIN, New Orleans, La. We have listened to an interesting presentation of the history of mouth hygiene from the remotest antiquity to the present day, testifying to the importance which, except during barbaric epochs, was attached to the maintenance of the health and cleanliness of the mouth. Ancient documentary support is somewhat fragmentary, owing to the destruction of priceless volumes and papyri from the library of Alexandria, which, had they become our heirloom, would no doubt have advanced all sciences by a few centuries, including dentistry and oral prophylaxis. If these documents had been preserved, the faithful practice of mouth hygiene, from childhood to the grave, to protect both the teeth and the general health, not only by improving masticatory function, but by guarding against extraneous infection, would probably by this time have become a recognized truth as trite as the heat of Kansas City.

Dr. Thorpe, in his panoramic paper, dwells more on the history of mouth hygiene, some of it quite ancient, than on proper modern technique, both at home and for office practice. However, some passages clearly hint at the similarity of an unclean mouth to an incubator for the rapid development of countless typhoid, pneumonia, and eruptive-fever germs and pus bacilli, all ready to infect the system the moment that arterial blood of good quality ceases properly to fill the tissues at the points of entrance of infection. Of course, leptothrix bacilli, when furnished with an excellent pabulum for growth, do not neglect to use the opportunity for breaking down tooth structure. Considering the necessity of maintaining a proper guard by means of an adequate arterial blood supply to the tissues, while their arterial hyperemia protects them in turn against local disease, several points must be given due importance:

First. Proper diet, hydrotherapy, and general hygiene.

Second. Exercise in the open air, to stimulate the heart's action while the blood takes in oxygen.

Third. Horizontal rest to allow the arterialization of tissues which are starved by too prolonged an upright posture.

Fourth. Massage so practiced as to repulse venous blood toward the heart.

The first two items require no comment beyond the fact that their importance is universally recognized, and that they must be varied according to the age and physical condition of the patient.

The importance and therapeutic value of horizontal rest has, as far as I know, received its first scientific explanation from Dr. Otto Lerch of New Orleans. In warm climates especially—and this should apply to Kansas City especially—columns of blood drop the more as the tissues relax, and the pump exhausts itself in an effort to keep the pipes above it properly filled. This explains why wrinkles form early in life, and why the upper portion of the body grows old first. The noon hour "siesta" of equatorial regions has resulted from experience, that unerring teacher.

Massage is really valuable by helping the veins to return the venous blood to the heart by pressure applied from the periphery to the center. The gums are no exception. All attempts at massage with a brush, rubber points, or a vibratory appliance, may furnish some stimulation, but no more. Nature supplies the means, viz, the thumb and finger, applying pressure from the gum margins apically, thus forcing back the venous blood. The arteries are deeper, and will

pump blood into the tissues thus emptied with each beat of the heart. Brushing done vertically, and perforce in a reverse direction so that the bristles sweep from the gums into the embrasures, does not massage, but stimulates the gum tissues, besides properly cleansing the teeth without wearing grooves at their necks. It is the horizontal (crosswise) brushing which wears such grooves, much more than any dentifrice employed. The deposition upon the teeth of inspissated mucus charged with epithelial cells, bacteria, and calcium salts, and particles of the creamy bolus of mastication, is the cause of nearly all dental ills. It takes more than any paste, or even precipitated chalk, constantly to break up such deposits, facilitate their removal, and *polish* the teeth. On approximal surfaces a flat floss charged with an effective polishing powder, and elsewhere a *dry* brush charged with a powder of fine, smooth grit, are required. A powder containing some cuttlefish bone so finely pulverized as to sift through a sieve of 120 meshes to the linear inch, and appearing perfectly amorphous when its particles are magnified 600 times, is not only a safe, but an effective polishing agent for the teeth, because it readily breaks up plaques and films deposited upon them. Furthermore, brushes carrying such a powder into action must have lively bristles, must be small enough, and so shaped as to afford the greatest facility possible for the proper motion of these bristles and their free reach into otherwise inaccessible places. It is well enough to preach mouth hygiene to our patients, but it is a futile hope to expect them to do nearly impossible feats. They must be supplied with implements which facilitate their task if they are to do it thoroughly. A nail-brush is small enough to use in a washbowl, but an attempt is habitually made to use one but little smaller inside the mouth! What hope is there that it may reach between the cheek and the upper molars, and distally of the third upper molars, or gingivally and lingually of the lower third molars? Occasionally a real scouring should be instituted by means of an actively cleansing powder, the usual polishing to be afterward resumed. Pumice particles never completely lose angularity, no matter how finely pulverized, because pumice crystals are angular; but if reduced to the fineness just mentioned a powder containing a proportion of pumice can be used constantly, let alone occasionally, without the slightest fear of scratching the teeth. Of course, cervical grooves can be worn by continued, improper, crosswise brushing. They would be made by bristles alone. Dr. Miller's experiments were made by the revolution of bristles charged with gritty dentifrices mesio-distally of teeth.

In New Orleans many of us have for years grown rather exclusive as to the armamentarium with which we have our patients supplied, that they may practice mouth hygiene effectively. We have it all at home—proper flosses, brushes, powders and washes—and we do not even neglect the dorsum of the tongue, whence reinfection of the mouth so frequently occurs within a few minutes after it has been cleansed. We do not prescribe a whalebone, however, or any other old thing which may, or may not, do proper service. Luckily, we are equipped with real tongue-cleansers, and we tell our patients how and when to use them. As a last step in the toilet of the mouth, we insist upon its being flushed out with a wash capable of stimulating the glands to do their own secreting of alkaline saliva. Dr. Thorpe mentions that Fauchard highly recommended the use of freshly voided urine as a mouth-wash, and I infer from Fauchard's apparent conviction on the subject that he must have obtained quite satisfactory results from that practice. It was economical, at least. Personally, I have no knowledge on that point, because I have never made the clinical tests necessary to obtain it, nor have I had such tests made by patients, but it may not be at all impossible that Fauchard's mouth-wash was in line with the studies of Pickerill, Kirk, and Black.

Dr. Thorpe (closing the discussion). I wish to thank you for your attention during the reading and discussion of my paper. In deference to Dr. Grieves, who

is to read an excellent paper, and the discussion of which is to be opened by Dr. Hall of Kansas City, a celebrated pathologist, I will not say much in closing. We all have heard more or less of prophylaxis, and we all have our views in regard to it. It is our duty as dental surgeons both to teach and to practice this very necessary department of dentistry.

The next order of business was the reading of a paper by Dr. CLARENCE J. GRIEVES, Baltimore, Md., entitled "Dental Periapical Infections as the Cause of Systemic Disease."

[This paper is printed in full at page 52 of the present issue of the COSMOS.]

Discussion.

Dr. FRANK J. HALL, Kansas City, Mo. Before I begin my discussion, I want to congratulate the audience on being the most courageous that I have ever seen; you are certainly good stayers when it comes to standing heat.

I am not going into any extensive discussion, for one definite reason; that is, because the paper has involved so many features that it is impossible to discuss them. Too many factors have been brought to your attention to permit of detailed analysis. There are, however, a few items that I may mention in regard to peridental abscesses, and they are facts gathered from the general principles of the study of purulent accumulations. First, we know that any tooth that has been diseased is more or less a foreign body within the tissues of the jaw, and we must carefully treat the cavity that harbors a dead pulp, else sooner or later we will have the process of suppuration taking place in the environment of the tooth that has been more or less disturbed by the death of that pulp. Teeth that have been improperly filled and hastily crowned, sooner or later suffer from periapical abscess; and these periapical abscesses are not the result of infections from the blood stream, as is sometimes pointed out, but are due to local infections. The idea that many diseases arise from periapical abscesses is not borne out by experience. In the first place, the germs of many of the diseases mentioned, endocarditis, rheumatoid arthritis, etc., are practically never found about the teeth. Once in a great while we find some special variety of pathogenic organism there, but they are not micro-organisms that are generally involved in the suppurating processes of the teeth. The vast majority of periapical abscesses are due to our common pus-producing streptococcus. This, with the ordinary staphylococcus that causes pimples of the face, boils on the neck, and other suppurations, is present in every mouth, and readily flourishes in bone where the tissues are irritated by the presence of a foreign body. So we must view these conditions with some degree of common sense, and I do not think it is necessary that the dentist should worry himself about diseases of the system, but busy himself with a careful toilet of the root-canals which he is attending to. When the tooth becomes an offending member, its apex septic or necrosed, and is no longer capable of being sterilized by proper measures, it should be extracted before the necrosis becomes a serious menace to the life of the patient. I see almost every day dentists working on teeth that are hopelessly gone, with the alveolus in a state of necrosis, and they continue this until the bur has to be used to cut out the dead tissues involved. My opinion, therefore, is simply this—that a tooth with a putrescent root-canal is a foreign body, and must be rendered absolutely sterile before the tissues will tolerate it; when the tissues will not tolerate such a tooth, it is just like a thorn that has run into the flesh, which should be removed.

Dr. F. B. MOOREHEAD, Chicago, Ill. I appreciate the fact that you have listened to a splendid paper, read under somewhat trying conditions, and I will not detain you a great while. There are four or five items that I wish to discuss briefly and hurriedly.

The first point the essayist emphasizes is conservatism. Dr. Frank Billings of Chicago read a paper not long ago on the tonsils as a focus of infection, and

pointed to some lesions in the body which had their origin in tonsillar infection, and as a result of that paper there was a widespread removal of tonsils. The fact that infections may possibly arise from the teeth does not mean that all the ills of the body will be averted by the extraction of the teeth—nothing of the kind. That the mouth is an exceedingly important focus of infection cannot be denied—and I suppose, if we isolated the mouth and took it as a pathological unit, it would perhaps be the most prolific focus of infection in the body; but I would not have you run riot in the extraction of teeth. It amounts to malpractice to extract teeth which can be saved to the comfort and benefit of the patient. On the other hand, it is wrong to retain a tooth in the mouth that has lost its usefulness and may mean the patient's discomfort and possible danger. We must weigh one possibility against the other.

The second point is the relation of the dentist to the physician. In this connection let me say that the physician is first in the medical world. Around him stand the so-called medical specialties, of which your profession is one. The physician is the vine and we are the branches, and it is up to the dental profession to see to it that the branch they represent is a luxuriant one and reflects credit on the parent stem. All through literature we find criticisms advanced on the part of the dentist against the physician, but we should just remember this fact—that the eye, the ear, the nose and throat, the skin specialist, and the other medical specialists, have each in turn to solve the problem peculiar to the field in which he is engaged. He need not expect anybody else to do his work, and we have no right to expect the medical man to work out the pathology of the mouth, or the technique of treatment in the mouth. That is our office, and we have no right to criticize the physician until we have produced a definite working pathology of the oral cavity and a rational treatment of the lesions of that organ. When we have done as much as some of the other medical specialties, our profession will stand related to the physician as it should, viz, as a contributing member to all medicine. We are not making any progress by ignoring the physician. I fear there is too much of an antagonistic attitude on the part of the dentist toward the physician. The less antagonistic we are to the physician, the better we shall get along with him. We must bear in mind that we must work together, that we are a part of the great healing art, and "Let us be brethren!"

There are two factors to be borne in mind with reference to infections—the virulence of the organism and the resistance of the tissues to it. These two factors must be estimated in each case. There are two types of dangerous infections of which Dr. Grieves has spoken: First, the acute infections in which the micro-organism gains entrance and quickly permeates the blood stream. The symptoms, however, are so well marked that it is not necessary for me to discuss them. The second type is the so-called subacute or chronic infections. It seems to me that the crux of this type of infection, represented by joint and other lesions, lies in the following fact: Given a focus in the jaw which is more or less perfectly walled off by a connective tissue capsule, inside of which are found granulations and rapidly multiplying bacteria which manufacture toxins. The antitoxin molecule found in the circulation is a larger molecule than the toxin molecule found inside the encapsulated focus. The toxin molecule, therefore, may penetrate the membrane and become free in the circulation, while the antitoxin molecule, being larger, may not gain entrance to the focus of infection. I do not think the danger from swallowing pus is so great as it is estimated by some to be. Not long ago there appeared in the *Journal* of the British Medical Society a symposium on the subject of the etiology, diagnosis, and medical treatment of gastric and duodenal ulcer. Some who took part in that symposium spoke of alveolar infection as contributing to gastric ulcer, believing that it was the pus directly transmitted from the mouth through the esophagus and stomach into

the intestinal tract that did the harm. Dr. Rosenow of Chicago has produced gastric and duodenal ulcers experimentally in animals. He takes the streptococcus viridans, the organism found most frequently in these mouth infections, and by raising its virulence to a certain point by animal passage he produces hemorrhage in the heart valves. By further changing the virulence, he produces hemorrhages in joints. Again, he produces small hemorrhages in the mucosa of the stomach and upper intestines. By this process, definite ulcers may be formed. Dr. Rosenow has done more than that; he has produced rheumatism repeatedly by raising this organism to a certain virulence.

There is one other point in this connection: Infections of long standing seem to produce a disturbance in the physiological balance, and the removal of the focus may not cure the patient. Certain tissue changes may become permanent and may not respond to any kind of treatment. I believe that in some cases the whole organism is so impressed that recovery may not follow the removal of the focus. This fact ought to serve as a warning of the danger of chronic foci of infection.

Root-canal treatment forms a most important chapter in the practice of dentistry, and I speak from experience when I say that a large number of chronic infections can be traced to faulty root-canal treatment. The treating and filling of root-canals is therefore a paramount problem.

Dr. GRIEVES (closing the discussion). I simply want to thank you for your kind attention, and beg your indulgence for keeping you so long.

Section III then adjourned until a later session.

WEDNESDAY—*Second Session.*

The second session of Section III was called to order by the chairman, Dr. J. P. Buckley, Chicago, at 8.30 o'clock Wednesday evening, July 9th.

The first order of business as announced by the chairman was the reading of a paper by Dr. H. B. TILESTON, Louisville, Ky., entitled "The Application in Practice of What is Known Concerning the Diagnosis and Treatment of Diseases of the Dental Pulp."

[This paper is printed in full at page 21 of the present issue of the COSMOS.]

Discussion.

Dr. C. L. HUNGERFORD, Kansas City, Mo. I imagine that every man who expects to impress his hearers with the advocacy of reforms, or to clear away a path that has been obstructed by disuse, or to break through a new path never trod before, must be an extremist. Now, I know of no reason why the chairman of this section should have called upon me to discuss this paper, save that I, in desperation over the absurd teachings of years ago, read a paper before this association at Niagara recommending the wholesale destruction of pulps. I have seen no reason to withdraw from that position, except that I am more careful about stubbing my toes. In the following I shall try to answer some few of the essayist's queries and remarks. With his final statement, that it is not necessary to destroy the pulp of a tooth when a gold crown is to be placed upon it, I agree. Neither is it necessary to destroy the pulp of any tooth for any cause except that the pulp is in the way of a permanently successful operation. My belief is that capped pulps live a miserable life, and eventually die. Dr. Tileston says the first evidence of the value of the dental pulp and the necessity for its preservation is the fact that, after its destruction, the tooth structure commences to disintegrate. I scarcely think the enamel commences to disintegrate. It has lost its formative membrane, but so long as it is kept moist, it does not crack; neither does the cementum, upon which the tooth depends for its vital connection with the system, degenerate, owing to its physiological contact with the body, but depends entirely upon the periosteum. One may take out all of the pulp and the physiological relationship of the tooth will remain just the same as it

was before the pulp was destroyed. That is theoretically true, though there may be difficulties that we meet with in our practice, since we do not always accomplish the total extirpation attempted.

The essayist does not believe that caries is more readily established by the destruction of the pulp, but claims that, if it has been established, it runs a more riotous course. Caries is in no sense a disease—and I wish I could impress that on your minds—it is not a pathological condition. It has nothing to do with the economy. It is true traumatism, as much as the cutting of the hair. It is a chemical process that is taking place, external to the economy, and disease is instituted only after the soft tissues are reached and pathogenic germs find their entrance through these channels. Therefore, I do not believe that chemical changes will occur more rapidly in a dead tooth than in a vital one, nor that it is the experience of the average practitioner that caries runs a more riotous course after the destruction of the pulp than before.

The essayist further states that recession of the gums occurs and the roots of the teeth become blackened, whereas the neighboring teeth with vital pulps stand in their pristine beauty. I grant that this is true, but it is because the dentin of the teeth has absorbed the dead organic matter of a pulp that had been capped, and has afterward died. If a healthy pulp is thoroughly extirpated, and the canals are filled perfectly, the tooth does not discolor nor do the gums recede, as I believe every one of you will agree. You have seen more cases of recession of the gums in vital than in dead canines, barring cases due to pyorrhea.

It is also stated in the essayist's paper that deposits of secondary dentin will bring relief in cases of slight irritation. In my opinion, wherever secondary dentin makes its appearance, except in the normal progress of old age, where the walls are built around toward a common center, it will be followed by pulp nodules, and be a constant source of irritation to the individual whose teeth are so affected. Such teeth will not return to health. Secondary dentin is always followed by irritation and subsequent death, as far as my experience goes.

It is, of course, proper to soothe sensitive teeth before attempting their devitalization, but inasmuch as we have rapid methods of devitalization, ten or fifteen minutes being generally sufficient for this operation, why wait over night and thus give the patient more or less discomfort when the operation can be done so readily and quickly, and practically painlessly, if it is to be done at all? I would like to enter a protest against the use of arsenic, which drug has not been used in my office for fifteen years. If we attempt to devitalize a pulp with arsenic, we merely get a cessation of sensitiveness to thermal changes in twenty-four hours; but if we expect to deaden the pulp so as to secure its removal without pain, the arsenic must remain in the cavity for three or four days or a week, and by that time it will be found that the cartilaginous matter of the dentin has absorbed so much of the arsenic that it has penetrated not only through that cartilaginous matrix, but has also gone into the cementum of the tooth and through that into the vital peridental membrane, and will be a source of constant irritation. If a pulp has been destroyed by arsenic or any other chemical, the tooth will not be in such a healthy condition as if the pulp has been removed by a clean surgical instrument. I would rather have my hand cut off by a surgeon's knife than have it eaten off by acid, or fire, or some extraneous disease.

The essayist speaks about pulp nodules forming about a common center from an unknown cause. Later on in his paper he says that continued irritation, due to thermal changes and the like, produces pulp nodules. I agree with his latter statement. I have examined a great many slides made by myself and others, and although the cause is not known I rather think that pulp nodules are due to the end-fibers of the odontoblastic layer of cells forming secondary dentin in the body of the pulp. The mere presence of nodules in the body of the pulp is just as inexplicable and irrational, we will say, as the formation

of secondary dentin about the other terminals of the odontoblastic layer that find their way into the pulp.

I am not an authority on any of these subjects. I only speak of that which I have observed in practice. The essayist speaks of non-septic pericementitis, but I know of no form of irritation of the peridental membrane or any other membrane that is not infectious, except that due to traumatism; for, if a tooth be malleted, until the membrane is sore, it will get well in a day or two. If, in forcing a crown on a tooth, the membrane is bruised, it will get well; but a continuous, persistent irritation around its apical portion means septic matter forced through the apex.

I have never seen an exposed pulp that has been capped remain comfortable for long. The percentage of dead, pulpless teeth that have never been treated and which have given no trouble is no greater than that of the teeth that have been capped and have given no trouble.

It seems to me that the whole question of the pathology of so-called diseases of the dental pulp simmers down to this one point—the anatomical position of the pulp tissue in the body of the tooth. Therapeutists especially speak of treating the dental pulp in the same way as they would treat a local inflammation somewhere else in the body, where there is an unobstructed circulation, and where the phagocytes have a chance to destroy the pathogenic germs that may be present; but the more Nature attempts to make repairs in the confined space of the pulp chamber, the more certainly she brings about strangulation and death of the tissues she is trying to protect. Any irritation of a dental pulp, if sufficiently protracted, will surely be followed by the death of this organ, no matter whether it gives trouble or not.

I think a tooth with a vital pulp is preferable to a tooth with a dead pulp, because in a vital tooth there is no danger of an imperfectly removed pulp, or of an undiscovered root-canal, or of apical canal portions remaining unfilled, or of infection by a septic instrument. Therefore, I would prefer a vital tooth all the time; but when a pulp stands in the way of making a sightly operation and of doing what seems to be the best in regard to the proper fitting of a crown, then I believe it necessary in many cases to destroy the pulp. But when, by any means, I can get around the destruction of the pulp, I adopt those means.

Fifteen years ago, at Niagara, when I spoke so radically regarding pulp destruction, I stood practically alone; perhaps two members of this association stood with me. But the swinging pendulum is coming back, and the profession as a whole is coming nearer to my position every year. I can well remember when Dr. Allport of Chicago recommended taking a V-shaped slice out of the pulp tissue, and bringing the edges together with a suture. Today, I destroy the pulps of teeth when they stand in the way of my work, or when I think that this procedure will further the comfort and health of the patient.

I would make this urgent plea: If it be found necessary to destroy the pulps of teeth, do not attempt to fill narrow, constricted canals. Never yet were these narrow tortuous canals well filled without proper instrumentation. Such canals must be enlarged so that proper access may be obtained. There are very few roots that are so small that the orifices of the canals cannot be enlarged with more or less flexible reamers in such a way that proper entrance can be effected for a gutta-percha point, and this can be carried to the apical portion of the root, thus filling the canal perfectly and preventing further trouble.

If we would give more attention to instrumentation and manual dexterity, the destruction of pulps, I believe, would not be followed by any of the objectionable features mentioned by the essayist. As stated by the essayist in the beginning of his paper, we are prone to take the easiest way, and the men who do not destroy the pulps of teeth, but resort to capping, are taking the easiest way: who—

But skin and film the ulcerous place,
Whilst rank corruption, mining all within,
Infects unseen.

Dr. H. J. GOSLEE, Chicago. The proposition before us is plain, clean-cut: When can we save a pulp—what are the clinical manifestations that indicate the preservation of a pulp?

I believe that a pulp can be saved when it is covered with a thin wall of healthy, normal dentin, and when there is active hyperemia in it. Now, what is active hyperemia—what are its symptoms? When a pulp causes pain after application of a known irritant, and subsides without treatment, not to start again until the application of another known irritant, and the duration of pain is but a few moments, never five or ten minutes—that means active hyperemia. The line of demarcation between hyperemia of the pulp and active or passive inflammation, or pulpitis, is that, in the latter, the exudate has penetrated through the vessel wall into the vascular tissue. In hyperemia the pulp never coagulates; in inflammation it always does.

I believe that painful active hyperemia starts not only from the application of cold, as stated by the essayist, but also following the disturbing conditions of influenza. Every practitioner knows that following an epidemic of influenza, patients complain of pain of short duration, which subsides without treatment. In such cases the loss of vasomotor control of the system allowed the bloodvessel momentarily to contract and expand, causing the inrush of blood and increased pressure on the nerves confined in the bony, root-like encasement.

How can we determine by clinical symptoms what pulps can be preserved? First: A pulp covered by healthy normal dentin. Second: One in which pain lasts no longer than ten or twenty minutes upon the application of a known irritant, or starts at least once in twenty-four hours without the application of a known irritant, but subsides without treatment within five, ten, or twenty minutes. Such pulps are only partially disturbed and can return to normal and remain so through life, provided that the inflamed area is small in comparison with the size of the whole organ—in other words, if there is only a partial, non-septic inflammation.

What are the symptoms indicating that a pulp cannot be saved? When a patient presents with a history of partial or total non-septic pulpitis, the pulp is doomed to destruction sooner or later, and it is the dentist's duty to remove it before it undergoes suppurating or putrefactive changes with a probability of apical involvement. In such cases the patients state that the tooth some time ago began to ache very badly, as in active hyperemia, and that, later on, the pain started once or twice daily without provocation by a known irritant, and usually in the evening, or after dinner, between seven and ten o'clock. If the case is one of nearly total pulpitis, the patient will state that he had to sit up during the night, the pain being very severe, and that sitting up gave some relief. This relief is due to the change in blood pressure. In such cases the pain starts without the application of any known irritant and lasts from one to three hours. It would be absurd to treat such a pulp in an attempt to save it, though its life could be prolonged for many months.

When a tooth is sore upon pressure, owing to a pulp disturbance at the end of the root, there is not necessarily an infection, because I can conceive of a condition of non-septic apical pericementitis. In such non-septic apical pericementitis in vital teeth, the patient will usually state that for more than three days he has had intermittent pain, first of considerable severity once or twice in twenty-four hours, and that the tooth then became sore on pressure. If, on the other hand, the pulp is infected, the tooth will be sore on pressure in from eight to thirty-two hours; therefore, from the rapidity, and from the absence of periods of rest from pain, we can conclude whether we have to deal with an infected or a non-infected condition. All pulps which are affected and in which relief is obtained by the application of cold, either are undergoing a degenerative change or will do so in the very near future.

A pulp can be relieved of pain by the

application of cold, when no infection is present; when there is infection; or when the pulp has undergone putrefactive changes—but in all three cases it is important that the pulp chamber be opened, and so the rule holds good. All pulps that are covered with decalcified dentin, or have been exposed by dental caries, should be considered as infected pulps.

Sometimes, after filling a root-canal, the tooth becomes very sore, and the dentist fears that an alveolar abscess is developing.

Pathologists are now agreed as to determining whether soreness to pressure in a tooth is due to the root-canal filling, or to the remedies employed, or to instruments carried to the end of the root, or to bacterial infection. This agreement is based on the following clinical symptoms: If a root-canal is overfilled, or irritating remedies or broaches are carried into the periapical tissues, the tooth will begin to feel sore in from six to eight hours. This disturbance in the periapical tissue will reach its height within twenty-four hours, and will then gradually recede, unless a gutta-percha point has been forced through the apical foramen. If bacteria have been introduced, they will set up an alveolar abscess, of which the patient will be unaware for about twenty-four hours, and which will become very active in thirty-six or more hours.

With regard to arsenic, and other devitalizing agents: I always feel that if I have destroyed a pulp with a devitalizing agent I am in a better position to remove all pulp tissue than if I have merely anesthetized the pulp. I should also emphasize that formalin should not be sealed in every pulp chamber. It is not meant for that purpose. The man who gave us tricresol and formalin did not tell us to practice root-filling with the use of a single remedy. Sometimes I find it useful when employed as a counter-irritant. Tricresol and formalin is especially valuable in conditions of putrescence, but it is not indicated in the early stages of infection of the pulp. Now, what is the difference between suppuration of the pulp and putrefaction of the pulp? Suppuration of the pulp is the production of pus at the expense of the life cells of the organ; putrefaction of the pulp is a further reduction of tissue that is already dead. Formalin cannot irritate a putrescent pulp, but it can control the putrescent process very positively. If vital tissue remains in a pulp chamber, tricresol and formalin should not be employed.

I believe that it is possible to have secondary dentin deposited on the walls of a root-canal, and have the pulp remain vital as long as the patient lives.

Dr. TILESTON (closing the discussion). I think Dr. Buckley, in choosing Dr. Hungerford to open the discussion, caught a live wire. He has added a good deal of zest to the discussion by taking issue with my paper.

He said the tissues of the tooth would not disintegrate. I did not use the word "disintegrate," but "degenerate."

Did you ever see a city pavement that was made of blocks of granite being repaired or replaced because the underlying support had given way and the blocks, while still uninjured themselves, had sunken down and become degenerated as a pavement? It is quite possible in this degeneration that follows the death of the pulp for the enamel to be very seriously injured, without being exactly *disintegrated*. It is affected by the gradual degeneration of the tooth which follows the death of the pulp. The tooth degenerates in a different way from that which is noticeable in a vital tooth degenerating through pyorrhea, for instance. A pulp which dies in a tooth and is not removed will of course cause the tooth to discolor. At the same time a tooth which dies, but in which the pulp has been removed before putrefactive changes have taken place, will have a different appearance upon close observation from a vital tooth. While it may not discolor in early years if properly cared for, it soon takes on an opacity and will eventually discolor, finally becoming almost a foreign body, which nature attempts to cast out.

Dr. Hungerford says that he does not believe that caries is a disease. I presume he would call it a condition. It

is both, in my opinion, because we admit that the active cause of caries, as has been emphasized in Dr. Coolidge's essay on "The Etiology of Dental Caries," is associated with active germ life. If we do not look upon caries as a pathological condition, we must separate it entirely from living organisms, such as germs, as a causative factor.

The question of the vital resistance of teeth must not be lost sight of in considering the rapidity of the progress of caries. I said a tooth which is not vital, if attacked by caries, will follow a more riotous course than will be the case in a vital tooth. This is because, in a vital tooth, we have that resistance to the progress of caries known as vital resistance. A tooth with a vital pulp will obstruct the progress of caries, in my opinion, more effectively than one which does not possess that vital resistance.

As to the question of secondary dentin acting as an irritant: In every carious tooth in which the progress of caries is toward the pulp, as it is in most instances, after a certain length of time the pulp will seek to protect itself by a deposit of secondary dentin. If what Dr. Hungerford says is true, viz, that secondary dentin is always an irritant and eventually is an obstructive agent destructive to that pulp, then in every tooth in which a carious cavity forms the pulp would eventually die, which we know is not the case. Secondary dentin is not an irritant, except when it occurs in an irregular deposit such as sometimes results from certain pathological conditions of the pulp, but which is not that kind of secondary dentin which occurs naturally as evidence of advancing age or from the effect of caries encroaching on the pulp.

In the use of arsenic, it was stated a few years ago, shortly after the beginning of the use of cocain in the process first known as "funking" the pulp, or the usual method of pressure anesthesia —and the statement was credited to Dr. B. Holly Smith—that the use of arsenic was malpractice. But that statement has since been modified, I think, even by Smith. One who has practiced dentistry for thirty years, using arsenic more or less continuously all that time without any unhappy result, I think is justified in saying that arsenic is not a dangerous drug to use in the devitalization of the pulp, if used properly. A very minute quantity of arsenic is required to devitalize a pulp—so small, indeed, that I believe some dentists do not conceive the minuteness of the quantity necessary for this purpose. I heard Dr. William C. Barrett make the statement once that he had a bottle in his office in which a quantity of arsenic in crystalline form had at one time been kept, the bottle being then practically empty, the inside of which was coated with the dust of arsenic which had been there for years, and when he wanted to devitalize a pulp he touched the moistened cotton to the inside of that bottle, and the minute quantity of arsenic which adhered to the cotton was sufficient for the purpose. If we take too much arsenic, or leave even a small quantity in the tooth too long, an unfortunate result will be produced. If used judiciously it will effect the purpose and not be injurious to the tooth.

As to the formation of pulp stones being attributed to the action of the odontoblasts, I think Dr. Hungerford has a wrong idea as to the function of those cells. Lying as a single, membrane-like layer on the surface of the pulp, the odontoblasts deposit calcic salts to form the dentin, but they have never been supposed to be responsible for the formation of pulp stones or nodules, which are accretions of calcific matter in masses, usually within the body of the pulp, and in no way connected with the odontoblastic cells. It is true that sometimes they are adherent to the inner wall of the pulp chamber, but their structure is such as to differentiate them from either primary or secondary dentin.

It happens, in some cases, where there is no possible way of accounting for any septic infection, that we have a soreness on percussion—an evidence of soreness at the apical end of the root. That happens when we force a gutta-percha point through the end of the root into that area, and it happens very frequently after a perfectly aseptic removal of a pulp which had contained pulp stones.

This tenderness to percussion may be due to one of several causes, apparently non-septic, because it never results in the breaking down of the tissue into pus.

As to capping of the pulp: If an exposed pulp be capped without pressure, and be perfectly protected against infection by bacteria, there is no reason why it should not retain its healthy condition. It has only been treated in the manner in which any surgeon would treat a fresh wound. I know from my own practice that pulps that have been capped retain their vitality for many years and remain normally sensitive to thermal changes.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-fifth Annual Meeting, Philadelphia, Pa., June 24 to 26, 1913.

TUESDAY—*Morning Session.*

THE forty-fifth annual meeting of the Pennsylvania State Dental Society was called to order on Tuesday morning, June 24, 1913, at 10.30 o'clock, in the Scottish Rite Hall, Philadelphia, by the president, Dr. C. V. Kratzer, Reading.

Rev. Dr. WILLIAM HENRY OXTOBY, Philadelphia, Pa., invoked divine blessings on the deliberations of the association.

Dr. JOSEPH NEFF, director of public health, representing Mayor Blankenburg, welcomed the association to the city of Philadelphia.

Dr. H. W. ARTHUR, Pittsburgh, responded to the address of welcome on behalf of the society.

The first order of business was the reading of the minutes of the last annual meeting.

After the transaction of routine business,

The next order of business was the report of the Committee on Dental Science and Literature, by Dr. E. S. FILBERT, Pottsville, Pa., chairman, as follows:

Report of the Committee on Dental Science and Literature.

By Dr. E. S. FILBERT, *Chairman.*

In presenting this committee's annual report on the year's advance in dental science and literature, it will be my aim to present to you those articles which, in your committee's estimation will benefit the members.

SCOPE OF REPORT.

Last year, the profession was provided with many articles on the cast gold inlay, while this year the most numerous and important articles are those treating on nitrous oxid and oxygen.

This report has been compiled under the headings of Nitrous Oxid and Oxygen, Orthodontia, Radiography, Gold Inlay, Pyorrhea, and Miscellaneous Papers. While the papers here listed do not include all the contributions on the subjects listed that appeared in the *Dental Brief*, DENTAL COSMOS, *Dental Digest, Items of Interest, Dental Review, Dental Summary, Ash's Monthly,* and *Oral Hygiene,* yet your committee believes that the papers will give each and everyone sufficient information to repay him for reading them.

In previous reports, it has been the custom to present extracts from articles,

but it is your committee's belief that the members of the profession would rather have presented to them a list of the articles than extracts. While the list may be considered rather lengthy, yet it embraces contributions for everyone. While there have been no numbers designated from *Oral Hygiene*, we would recommend the reading of this magazine to those who are especially interested in the hygiene and school inspection phases of dentistry. The laity number is an especially good number, and fills a long-felt want.

STEREOSCOPIC SKIAGRAPHS.

Attention is called to the article "Stereoscopic Dental Skiagraphs," by C. Edmund Kells, Jr., of New Orleans, La., which appeared in the DENTAL COSMOS for July 1912. Your committee would recommend a close study of this article, as there is a wonderful field for work to be accomplished along this line.

ERUPTION OF TEETH.

"Some Notes on the Dates of Eruption in 4850 Children under Twelve Years of Age," as compiled by Drs. W. W. James and A. T. Pitts of London, shows the following results with the explanation appended:

	Yrs.	Mos.	50 per cent. present.	
At	6	0	Lower 1st molars	
"	6	3	Upper " "	
"	6	6	Lower central incisors	
"	7	6	Upper " "	(a)
"	7	6	Lower lateral "	(a)
"	8	9	Upper " "	
"	10	0	" 1st bicuspids	
"	10	6	Lower " "	(b)
"	10	6	" canines	(b)
"	11	0	Upper 2d bicuspids	
"	11	9	" canines	
"	12	0	Lower 2d bicuspids	(c)
"	12	0	" " molars	(c)

After 12 (say 12 yrs. 6 mos.) Upper 2d molars.

(a) In upper central incisors 100 per cent. is reached six months earlier than in lower central incisors.

(b) 100 per cent. is not reached in either case.

(c) Upper second bicuspids commence earlier and show a larger proportion, although 100 per cent. is not reached.

NITROUS OXID AND OXYGEN.

"Nitrous Oxid and Oxygen as a General Anesthetic, and Its Use in Dentistry," by Dr. Chas. K. Teter, published in DENTAL COSMOS, August 1912, is an article that is recommended for study by the members of the society, especially by those who have been following the practice of analgesia as well as general anesthesia.

"Report of the Committee on Anesthesia of the American Medical Association." *Dental Brief*, August 1912.

"The Extraction of Teeth Under Nitrous Oxid and Oxygen." M. Friedland.

ORTHODONTIA.

"Orthodontia in Its Relation to Pyorrhea and Oral Hygiene." S. H. Guilford, DENTAL COSMOS, October 1912.

"Orthodontia of the Deciduous Teeth." E. A. Bogue. A series of articles appearing in the *Dental Digest*, beginning with the October 1912 number.

"Evolution of Orthodonia—Recent Developments." Edward H. Angle, August 1912, DENTAL COSMOS.

"Further Steps in the Progress of Orthodontia." Edward H. Angle. DENTAL COSMOS, January 1913.

RADIOGRAPHY.

"Some Uses of Radiography in Dentistry." J. J. Moffitt, DENTAL COSMOS, August 1912.

The articles, finely illustrated, on "Dental Radiography," by Dr. Howard Raper, are continued in the *Items of Interest*.

GOLD INLAY.

A very interesting paper for the gold-inlay enthusiast is that of Dr. C. S. Van Horn, under the title of "The Wax Pattern: A Technique, Together with Appliances, etc., for Its Execution." DENTAL COSMOS, September 1912.

"Something on Cavity Preparation for the Gold Inlay." J. V. Conzett, DENTAL COSMOS, December 1912.

"The Technique of Inlay-Making by the Direct and Indirect Method." F. T.

Van Woert, *Items of Interest*, January 1913.

PYORRHEA ALVEOLARIS.

"Pyorrhea, Its Causes and Treatment." W. F. Spies. DENTAL COSMOS, September 1912.

"Use of Splints in the Treatment of Pyorrhea." W. F. Spies. *Dental Summary*, August 1912.

"Vaccine Therapy for Pyorrhea." G. D. Layman. *Dental Summary*, March 1913.

"Chronic Alveolar Osteomyelitis (Pyorrhea Alveolaris)—Its Causes, and Treatment with Vaccines." Leon S. Medalia, M.D., DENTAL COSMOS, January 1913.

"The *Locus Minoris Resistentiæ* in Pyorrhea Alveolaris." Edward C. Kirk, D.D.S., Sc.D., DENTAL COSMOS, June 1913.

MISCELLANEOUS SUBJECTS.

The following papers have not been listed under any separate heading:

"An Inquiry Into the Possible Relation of Sulfocyanate to Dental Caries." William J. Gies, M.S., Ph.D., DENTAL COSMOS, January 1913.

A very interesting and instructive paper, one that will be of benefit to both dental and medical practitioners, is that of C. B. Prentiss on "Effects upon the Teeth of the Administration of Iron, Acids, etc., and the Precautions Taken by Physicians to Avoid Injury to the Enamel," DENTAL COSMOS, September 1912.

For those who prefer the manipulation of gold foil to the gold inlay, the paper of Dr. Charles E. Woodbury, in the November DENTAL COSMOS 1912, will be found instructive.

Note also the following:

"A Clinical Review of Certain Pathological Phases Concerning the Maxillary Bones." M. A. Federspiel, D.D.S., M.D., DENTAL COSMOS, December 1912.

"On the Importance of Oral Hygiene in Combating Tuberculosis." Dr. Vincenzo Guerini, DENTAL COSMOS, December 1912.

"Some New Original Instruments." W. C. Dalbey, *Dental Brief*, November 1912.

"What Progress Has Been Made in the Prevention of Dental Caries?" Wm. H. Trueman, *Dental Brief*, October 1912.

"Why Do So Many Pulps of Teeth Die Under Gold Caps? Why is a Pulp More Likely to Die Under a Cast Gold Inlay Than When the Tooth is Filled in the Usual Way." George A. Maxfield, *Dental Brief*, August 1912.

"Removal of Impacted Third Molars." C. Edmund Kells, Jr., *Items of Interest*, July 1912.

"The Technique of Impression-Taking and Model-Making." R. Ottolengui, *Dental Summary*, May 1913.

"The Speech Relation of Cleft-Palate Operation." George V. I. Brown, *Dental Summary*, May 1913.

"Heredity and Eugenics." E. P. Beadles, D.D., *Dental Summary*, June 1913.

"Peridentoclasia." Andrew J. M. McDonagh. *Dental Summary*, June 1913.

A series of three articles by Alfred Gysi on "Simplifying the Correct Articulation of Artificial Teeth," appeared in the *Dental Digest*, beginning with the January 1913 issue.

"The Principles and Practice of Tooth Extraction." William J. Lederer, *Dental Digest*, May 1913.

"The Relationship of the Thyroid Gland to Dentistry." H. Ewan Waller, *Dental Digest*, May 1913.

"The Development of the Teeth and Occlusion as Factors in the Development of the Facial Bones." Frederick B. Noyes, DENTAL COSMOS, February 1913.

"Removable and Stationary Crown and Bridge Work." Albert W. Jarman, DENTAL COSMOS, February 1913.

"A Warning Against the Indiscriminate Use of Formaldehyd Preparations." C. J. Grove, DENTAL COSMOS, February 1913.

"Local Anesthesia in Dentistry, with Special Consideration of Novocain." Richard H. Riethmüller, Ph.D., D.D.S., COSMOS, February 1913.

"The Reformation of Commercial Porcelain Teeth to Adapt Them to a Given Case." Norman S. Essig, *Dental Digest*, September 1912.

"Some Thoughts Concerning Our Little Patients." J. F. Nelson, *Dental Digest*, November 1912.

"The Ideal Porcelain Crown." Hart J. Goslee, *Items of Interest*, July 1912.

"The Prophylaxis of Dental Caries." Edward C. Kirk, D.D.S., Sc.D., *Items of Interest*, July 1912.

"Oral Prophylaxis." F. H. Skinner, *Items of Interest*, August 1912.

"Rheumatic Fever and the Contribution of a Septic Mouth and Carious Teeth to Its

Cause and Cure." Alonzo M. Nodine, *Items of Interest*, September 1912.

"Removable Bridge Work." Hart J. Goslee, *Items of Interest*, October 1912.

"Cavity Preparation." Albert R. Starr, M.D., D.D.S., *Items of Interest*, October 1912.

"Oral Prophylaxis in Dental Practice." J. H. Armstrong, *Dental Summary*, July 1912.

"Manifestations of Syphilis in Mouth and Relative Parts." H. H. Haynes, *Dental Summary*, August 1912.

"The Pathologic Findings of Some Diseases of the Teeth and Gums." V. A. Latham, M.D., D.D.S., *Dental Summary*, November 1912.

Those who wish to travel the road that leads to plenty in old age should read the article, "Investments," by Mr. Chas. G. Dawes in the *Dental Review* for July 1912.

"The Propagation of the Principle of Mouth Hygiene." Geo. A. Roussel, *Dental Review*, August 1912.

"Preventive Treatment of Peridental Disease." Arthur D. Black, *Dental Review*, September 1912.

"Modern Methods of Local Anesthesia." Hermann Prinz, *Dental Review*, March 1913.

"Constitutional Diseases Secondary to Local Infections." C. H. Mayo, M.D., *Dental Review*, April 1913.

"Suggestions in Oral Prophylaxis." F. H. Skinner, *Dental Review*, June 1913.

"The Influence Exerted by the Dental Arches in Regard to Respiration and General Health." Matthew H. Cryer, M.D., D.D.S., *Items of Interest*, January 1913.

"The Extraction of Teeth and Post-operative Treatment; With Special Reference to Irregular and Impacted Conditions." James F. Hasbrouck, D.D.S., M.D., *Items of Interest*, January 1913.

The new dental law of the State of Michigan, which has received much favorable comment, can be read in the *Items of Interest*, January 1913.

"Local Anesthesia of the Oral Cavity." Kurt H. Thoma. *Items of Interest*, April 1913.

"Aseptic Tooth-brush and Tooth-brush Sterilizer." Ernest C. Dye, *Items of Interest*, April 1913.

"Restoration of Occlusion by the Casting Process." J. Lowe Young, *Items of Interest*, May 1913.

"Inflammatory Lesions of the Jaw-bones." Robert H. Ivy, M.D., D.D.S., *Dental Brief*, February 1913.

"An Additional Method of Safeguarding Anesthetics." Francis A. Faught, M.D., *Dental Brief*, May 1913.

"Teaching Dental Economics." C. R. E. Koch, *Dental Brief*, June 1913.

"Cavity Preparation for Fillings and Inlays." F. W. Gethro, *Dental Summary*, January 1913.

"Service and Recompense." Robert A. Chatter, *Dental Summary*, January 1913.

"Some Problems that Confront the Dental Profession." W. G. Ebersole, *Dental Summary*, January 1913.

"Some of the Important Points in Dentistry that are Under Discussion at the Present Time." M. H. Cryer, *Dental Summary*, February 1913.

"The Condyle Path—Its Importance as a Factor in Masticatory Effort and Means of Registration." J. H. Prothero, *Dental Summary*, February 1913.

"Some Changes That Have Been Made in Dental Amalgams and the Attitude of the Profession Toward Them." Marcus L. Ward, *Dental Summary*, April 1913.

"Health—The Dentist's Care of Himself—Physical Training for the Professional Man—The Health of the Dentist from the Dentist's Standpoint." David Inglis, M.D., *Dental Summary*, May 1913.

"Demonstration of Methods in the Treatment of Simple and Complicated Fractures of the Jaw." H. J. Kauffer, DENTAL COSMOS, March 1913.

"The Treatment and Filling of Root-canals." J. J. Moffitt, DENTAL COSMOS, March 1913.

"Diagnosis and Treatment of Important Diseases of the Dental Pulp." J. F. Biddle, DENTAL COSMOS, April 1913.

"Implantation of Artificial Crown and Bridge Abutments." E. J. Greenfield, DENTAL COSMOS, April 1913.

"The Progress of Dental Caries in Relation to Cavity Preparation." Arthur D. Black, DENTAL COSMOS, May 1913.

"A Study of Potassium Chlorate." Alonzo M. Nodine, DENTAL COSMOS, May 1913.

"Alypin in Dentistry." Dr. Rudolf Machek, *Ash's Monthly*, June 1912.

"Two Cases of Correction of Congenital Mandibular Protrusion in Adults." Alfred Raubitschek, *Ash's Monthly*, July 1912.

"A Case of Infection of the Cavernous Sinus Due to Oral Sepsis." Gordon Taylor, M.S., *Ash's Monthly*, December 1912.

"The Use of Radium in Dentistry." H. Léger-Dorez, *Ash's Monthly*, April 1913.

NEW JOURNALS.

Northwest Journal of Dentistry, Portland, Oregon.

A new series of the *American Dental Journal*.

The Nebraska State Society will publish a journal, beginning in July.

BOOKS.

"Surgical Operations with Local Anesthesia." Arthur E. Hertzler.

"Operative Dentistry." Edward C. Kirk. Fourth edition.

"Dental Materia Medica.—Therapeutics and Prescription Writing." Eli H. Long, M.D.

"Dental Prosthetics." Geo. H. Wilson.

"Prosthetic Dentistry." Chas. R. Turner. Third edition.

"A History of Dentistry." Vincenzo Guerini.

"Dental Metallurgy." Chas. J. Essig and Augustus Koenig. Sixth edition, thoroughly revised.

"Orthodontics." B. E. Lischer.

"Text-book of Dental Histology." Frederick B. Noyes.

"Text-book of Crown and Bridge Work." Frederick A. Peeso and Archibald C. Eglin.

"Gray's Anatomy." Eighteenth edition.

"A Manual of Chemistry." New (tenth) edition. William Simon, Ph.D., M.D., and Daniel Base, Ph.D.

"Anesthetics in Dental Surgery." Frank Coleman.

"History of Dentistry in Cleveland, Ohio."

"Practical Dental Metallurgy." J. H. Hodgen.

"Anesthetics." J. Blumfield, M.D.

"Dental Jurisprudence: The Law Relating to Dentists and the Practice of Dentistry." William E. Mikell.

"The International Directory of the Manufacturers and Dealers in Dental and Surgical Goods, and in Addition, a Directory of Dental Surgeons and Dentists." This book contains the names of about 30,000 dentists practicing in all countries of the world, except Germany and the United States.

"The Prevention of Dental Caries and Oral Sepsis." H. P. Pickerill, M.D., Ch.B., M.D.S., L.D.S.

"Mouth Hygiene and Mouth Sepsis." John Sayre Marshall, M.D., Sc.D.

"The Prevention of Dental Caries." J. Sim Wallace, D.Sc., M.D., L.D.S.

"Physiology. A Manual for Students and Practitioners." A. E. Guenther, Ph.D., and Theodore C. Guenther, M.D.

"Oral Surgery. A Text-book on General Surgery and Medicine as Applied to Dentistry." Steward L. McCurdy.

"Lectures on General Anesthesia in Dentistry." William Harper DeFord, A.M., D.D.S., M.D.

"Microscopy, Bacteriology, and Human Parasitology." P. E. Archinard, A.M., MD.

"Local Anesthesia in Dentistry, with Special Reference to the Mucous and Conductive Methods." Prof. Dr. Guido Fischer. English translation by R. H. Riethmüller, Ph.D., D.D.S.

"The Surgery of Oral Diseases and Malformations; Their Diagnosis and Treatment." Geo. V. I. Brown.

"The Metallic Inlay." H. W. C. Bödecker.

"Baby's Teeth to the Twelfth Year." Albert Westlake.

"Principles and Methods of Orthodontia." B. E. Lischer.

"Text-book of Dental Pathology and Therapeutics." Based upon the original of the late Henry H. Burchard. Rewritten by Otto E. Inglis.

"School Dental Clinics: Their Foundation and Management." C. Edward Wallis.

"Surgery and Diseases of the Mouth and Jaws." V. P. Blair, A.M., M.D.

"Extraction of Teeth." J. H. Gibbs, L.D.S.

"Extraction of Teeth." J. F. Colyer.

"Anatomy and Histology of the Mouth and Teeth." I. Norman Broomell.

"The Prevention of Some Common Diseases in Childhood." J. S. Wallace, D.Sc., M.D., L.D.S.

"An Introduction to Dental Anatomy, Physiology, Descriptive and Applied." Arthur Hopewell-Smith.

"Medical Inspection of Schools." L. H. Gulick and Leonard P. Ayres.

"Interstitial Gingivitis and Pyorrhea Alveolaris." Eugene S. Talbot.

"The Practice of Dentistry." Leo Greenbaum, M.D., D.D.S.

"Food Talks with Children." John S. Engs.

"Text-book of Human Physiology, including a Section on Physiologic Apparatus." Albert P. Brubaker, A.M., M.D.

"Diseases of the Mouth." Dr. F. Zinsser.

"A Handbook on Surgery." Arthur S. Underwood.

NEW APPLIANCES.

Among the new appliances and accessories are the following:

Hot-water heater made by the Buffalo Dental Manufacturing Company; it heats water instantly.

Dr. Prescott's *Dental Disk-holder*. A simple disk-holder, designed to hold ½, ⅝, ¾, and ⅞ in. disks. It is somewhat similar to the small five-cent pocketbooks. It can be fastened to the bracket table or anywhere.

Pelton & Crane: *New bracket table*, heated and lighted.

Caulk's gutta-percha *Devito Caps* for

the sealing of medicaments over the pulp for devitalization.

Taggart's *Fluid Investment.* This consists of a fluid investment, which is obtained by the means of a scale, which is given with a can of the investment. On one side is placed the investment material, on the other the water, which must just balance. These are placed in a large rubber bowl and thoroughly spatulated for one minute and then jarred for two minutes, after which it is painted on the wax model. The remainder is then placed in the flask.

Your committee would beg leave to suggest to the society that a post-graduate course, similar to that of the Illinois State Dental Society, should be instituted by the society, so that any one of the members desiring information on any subject could have his desire satisfied by obtaining the information from headquarters.

Respectfully submitted,
E. S. Filbert, D.D.S.

The next order of business was the address of the president. Dr. H. S. Seip, vice-president, was called to the chair while the president, Dr. C. V. Kratzer, Reading, read his annual address as follows:

President's Address.

By Dr. C. V. Kratzer.

Mr. Chairman, and members of the Pennsylvania State Dental Society,—It is most fitting that, in presenting this address as president of your society, I express my cordial appreciation of the honor conferred upon me by my election to this high office. I feel most especially honored by the position I occupy at your hands, because of the present rejuvenated, healthful, and helpful aspect of this society as compared with the not always harmonious and unitedly-earnest-for-good past.

In greeting you, therefore, and bidding you welcome to this, the forty-fifth annual meeting of this society, I feel that we have some cause for self-felicitation on our state of being as an organization. Since the reorganization of the society—which took effect in 1909, embodying in our by-laws the component society membership plan—we have had a considerable increase in membership. At the beginning of 1909 there was a membership of about 325; at the close of the 1912 session the number had reached about 825, a gain of 500 in four years, or an average of 120 per year; this, of course, is a more rapid increase than we ever enjoyed under the delegate system of membership, and proves the new order to be efficacious as a means of enlarging the society numerically, and therefore extending its influence. There are, however, throughout the state, many capable and worthy men, some of them ethical practitioners, who are not members of any society, and it is an open question how best their interest in component and state society work might be aroused.

The society has enjoyed, too, since the new order was inaugurated, an increased income from dues, and while, in a sense, this is incidental, easy finances avail much in securing good material for meetings, and enabling the committee on the Enforcement of the Dental Law to do more effective work than in former years.

Membership and affluence, however, are not all our society needs to insure its success; it needs a greater awakening to the importance of solving the problems confronting the profession of today. It has always seemed to me that the presentations at our annual meetings of subjects of an elementary nature is a mistaking of the logical functions of central bodies of this sort, their functions lying rather in the consideration of the more advanced thought in physiological, pathological, bacteriological, chemical, and mechanical lines. Admitting that most of the younger men, and some of us older ones as well, are in need of a better understanding of important details in the *modus operandi* and technique of some of the more common, time-worn procedures, it would seem that the component or other local society meetings, where the members come into closer

touch with each other, feeling less restraint of expression and more free to confess their shortcomings, are the proper places for the discussion of the more common phases of dental practice.

The papers and clinics which your program, clinic, and other committees, after most painstaking labors, are placing before you on this occasion, are perhaps more in line with this thought than most of those of former years, and there is reason to feel that this meeting holds out, to those willing to partake, a feast of rich professional food which should be both pleasing and nourishing.

And, since experience has shown that meetings held in this metropolis of the state attract more men than do those held in the lesser cities, it is more than probable that, numerically at least, the meeting will be all that could be desired. This, together with the thoughtful arrangement of your committees in leaving one evening open for optional divertisement, and providing for another by bestowing upon the veteran charter members of the society a long-delayed recognition in the form of a complimentary dinner—in which, I almost forgot to say, ex-presidents are included—to be followed by a free-for-all (the president included) theatrical performance, would certainly seem to indicate that tastes and moods have been provided for in enough variety to warrant the assurance of a most interesting and delightful gathering.

It has seemed to me, too, that much time is often wasted at our conventions in talking about the wonderful progress of our profession, and setting up a sort of fetish, to the worship of which we challenge a wideawake and intelligent world. Surely it is no compliment to any calling that its votaries should consider it so remarkable that it *does* progress. Let us not prate, then, about our advancement; let us, rather, lend more time and effort to that advancement, forgetting not that we are but a small part of the profession, that achievement permeates all lines of human endeavor, and that kindred sciences have contributed not a little to such advancement as we may have attained.

TWO BENEFACTIONS.

Within a little more than a year past the profession of dentistry has witnessed the taking of two significant and tangible steps in the direction of a higher professional status in America. I refer to the laying of the corner-stones of two grand and most important dental institions—that of the Forsyth Dental Infirmary in the city of Boston on June 3, 1912, and of the Thomas W. Evans Dental Museum and Institute, in the city of Philadelphia, May 17th of the present year. Both of these are endowed benefactions. With the widely different purposes of each you are all familiar, so that it is unnecessary for me to dwell upon that here; but I cannot refrain from saying that, in the case of the Evans Institute, there is being born an immense factor in the direction of a higher dental education, and, since a higher education means a higher professional standing, we cannot but feel the most profound satisfaction as we realize the splendid prospect.

In a neighboring state dentistry has recently achieved a signal victory over bias and ignorance, by securing a legislative enactment legalizing the administration by its members of general anesthetics for any and all surgical operations. So far as I know, our right to do so in this state has not, in recent years at least, if ever, been questioned.

PROCESS PATENTS.

The professsion of dentistry has occasion for congratulation upon the judicial decision, during the past year, in the District of Columbia, against certain patents which its members have looked upon as a menace. I am aware, of course, that there is a diversity of opinion among men as to the justness, or otherwise, of the claims of one who has levied tribute upon his *confrères* for a process upon which he holds letters patent, whether he be able to prove priority of invention, or whether he be but the one who revives and brings about the practical introduction of an ancient process. And while we are all ready

to accord due recognition to the person who contributes to the profession so useful and progressive a process as the one in question, if he be not too selfish and exacting, yet I believe that most of you will agree with me that process patents are dangerous to the true professional spirit—and that the recent setback given them in a court of justice is a tribute to that spirit of our calling which aims higher than mere commercialism. I hope you will agree with me, too, in this: That to the few men whose self-sacrifice and perseverance have availed to rid the profession of an incubus which would have clung to and fed upon it, it owes a debt of gratitude and of dollars. Since writing the above I have learned that Dr. Taggart won his suit in Judge Landis' court in Chicago on June 19th, and his patents and all claims in reference to the process pertaining to castings of gold inlays with molten metals have been maintained. (Decision of the United States District Court.) Comment is unnecessary.

RECOMMENDATIONS.

It is customary for presidents to embody in their annual addresses more or less voluminous recommendations for the society to act upon. My observation has shown that these recommendations seldom get any consideration beyond that given them by a committee functionating to do so and present its report to the society. I therefore feel constrained to make no recommendations for the consideration of this body. I cannot, however, ignore several important subjects which at this time confront the dental profession of this as well as other states of the Union.

First, I desire to call your attention to the reorganization of the National Dental Association at its last meeting in September 1912, and particularly to the provision in its new constitution and by-laws, for a component state society membership instead of the optional, individual membership as heretofore. The plan is the same as that now in operation between this society and its component local societies throughout the state. It is incumbent upon this society to take action at this meeting upon the question of component membership in the National. The annual dues of each member under this plan are to be reduced from \$5 to \$1.

To all present members of the National Dental Association the saving of \$4 per year in dues will doubtless strongly appeal, and to all others the reduction should appeal none the less strongly, for whether they ever attend a meeting of the National or not, they will be obtaining a good dollar's worth in the bound copy of the association's annual Transactions; and it is an opportunity which few dental society members should miss.

The National association contemplates publishing its own dental journal some time in the future, which is to be issued to members by an additional \$1 in dues. The question ought to receive favorable action by unanimous vote of this society. Many of the state societies which have met since September last have already taken such action.

RELIEF FUND.

The National Dental Association, at its meeting in 1911, at the suggestion of Dr. L. G. Noel of Nashville, Tenn., created a committee for the purpose of formulating a plan to create a National relief fund for the purpose of aiding aged and indigent dentists, and placing the same before the various state societies, with the view of enlisting their aid morally and financially. The plan in the main adopted by the committee is—That the annual dues of state societies be increased one dollar, this extra dollar from each member to be devoted to the purpose named. Any other plan of annual contribution, however, which any state society may see fit to adopt will, I believe, be acceptable to the committee. The idea, in brief, is to pension aged and infirm dentists. Will you take any action upon this question?

In February last the state societies of Tennessee and Colorado had committed themselves to the committee's plan.

SCIENTIFIC FOUNDATION.

Perhaps the most notable and far-reaching action ever taken by the National Dental Association is the inauguration of a Scientific Foundation and Oral Research campaign. And the project, from its very inception, has met with the most surprising and commendable support, according to a report of the committee in charge, of which Dr. Weston A. Price of Cleveland, Ohio, is chairman. When the work was presented, by request, before the Cincinnati Dental Society, every member present contributed, making a total of $2500, or $500 a year for five years. When presented to a group of dentists in Cleveland, Ohio, fifteen of them contributed $2000, or $400 a year for five years. Great interest is manifested throughout the country by the profession, and—"The number and urgency of invitations to have the plans and work presented," says Dr. Price, "indicates that the spirit of the profession is at this moment intense to provide, by means of a general co-operation, for the bread-and-butter-problem of some competent men, that thereby they may be enabled to devote their entire strength and undivided attention to the solving of some of the urgent oral and dental problems that humanity and the dental and medical profession are crying for a solution of."

Dr. Chas. Mayo, in closing a splendid paper, read before a recent dental meeting in Chicago on January 31st, made the statement that—"It is evident that the next great step in medical progress, in the line of preventive medicine, should be taken by the dentists."

Laboratories and equipments, we are told, sufficient for a large staff of workers, have been freely offered by scientific institutions, and the committee of which Dr. Price is chairman has available already all requisites, except the money, for studying exhaustively, the following problems: Dental caries, its cause, prevention, and means for its immunity; pyorrhea alveolaris (so called), and all its peridental affections; systemic and distant infections having their origin in the mouth; erosion, its etiology and prevention; enamel atrophy, its cause and prevention; the metallurgical and physical problems, such as substitutes for platinum and iridio-platinum; dental alloys and amalgams; the physics of bridge construction and orthodontia, etc.

The committee has also found to be available some of the best qualified men in the various branches of oral and dental science, many of whom have an international reputation, and whose hearts are known to the profession to be deeply devoted to the solution of these various great basic problems. All that is needed, to consummate the project is an equivalent of $1 per year, for five years, from each member of the dental profession in the United States. During the five years thus provided for, the committee feels confident endowments could be secured to make the work permanent and to largely extend it.

The importance of this grand undertaking must be self-evident to every member of every dental society in this broad land of ours, and I trust and believe that the Pennsylvania State Dental Society will pledge itself, by unanimous vote, for an amount equivalent to $1 for each member enrolled at the close of this meeting.

Let us hope that a philanthropist will soon be found—or more than one, if necessary—who will deem it a privilege to endow an institution of this kind.

I believe it is the purpose to do limited research work in the Evans Institute, and this is good, but more is needed. Nothing but an independent endowment will do eventually. We are informed that recently in the Rockefeller Institute for Medical Research a new micro-organism in so-called pyorrhea alveolaris has been discovered. I submit that perhaps the founder of this great benefaction might, if properly approached, provide for an extension to it for oral and dental needs.

Dr. Price has kindly consented to bring this matter before this meeting, in person, and I trust I have not too much anticipated him in my remarks.

OFFICERS' ASSOCIATION.

From the Oklahoma Dental Society comes a suggestion to form an organization of state society officers, principally presidents and secretaries, to be auxiliary to, and hold annual meetings in conjunction with those of the National Dental Association. Dr. A. L. Walters, secretary of the Oklahoma Society, being properly authorized to do so—has accordingly called the first meeting, to be held in Kansas City next month. It is claimed that mutual benefits would accrue to the National and state societies through the co-operation engendered by such an organization. The promoters desire that officers act under instructions of their societies.

From Oklahoma comes, also, the idea of a post-graduate course in connection with state meetings. This feature is proving to them to be "very interesting and profitable," to use the secretary's words.

This, so far as my knowledge goes, is a unique undertaking for a dental society, and I give it to you for what it is worth. Whether, in a state so well supplied with schools of all sorts as is Pennsylvania, the matter is worth discussing, I leave for you to decide.

In closing these somewhat desultory remarks, I can do no better, with regard to the conduct of this meeting, than to quote the closing paragraph of my predecessor in office, by saying: "I am sure I will have your co-operation in the endeavor to make this meeting orderly and businesslike. If, upon rising, each speaker will address the chair, giving his name, it will assist the presiding officer and the official stenographer."

And to this let me add that I trust you will all endeavor to be in this room at the announced time for the opening of each session. By so doing much confusion and consequent hindrance to our work can be avoided.

Again I must thank you for this and previous honors you have bestowed upon me.

Motion was made and carried that a committee be appointed to consider the President's address, and report at a later session.

Dr. Seip appointed the following as the Committee on the President's Address: Drs. W. H. Fundenberg, Victor Cochran, and J. G. Lane.

Motion was made and carried to adjourn until the afternoon session at 2 P. M.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fifth Annual Meeting.

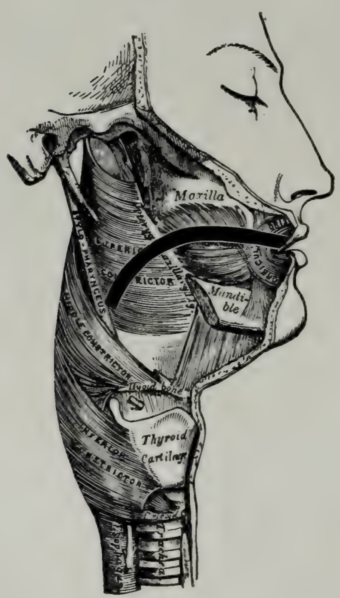
(Continued from vol. lv, page 1282.)

THE CLINICS.

Cleft-Palate Plate. (By Dr. Morton Van Loan, Albany.)

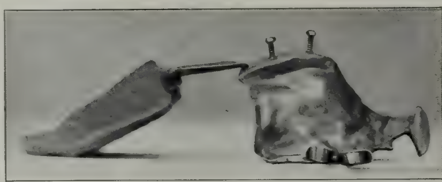
After several years of experience in trying to make a cleft-palate plate to restore the functions lost by a condition of congenital double cleft palate and double hare-lip, the clinician came to

Fig. 1.



the conclusion that there had been nothing yet made which was entirely satisfactory. Those who have studied the action of the throat know that during the act of swallowing the back of the throat rises and comes forward, and the whole muscular cavity more or less contracts. (See Fig. 1.) Therefore anything put in the back of the throat to fulfil the lost functions of the soft palate must be of a flexible nature.

Fig. 2.



All the cleft-palate pieces which have been made in the past have been made with a motion which causes them to rise, but not to fall. It was the clinician's opinion, before attempting to make the practical apparatus exhibited, that this

Fig. 3.

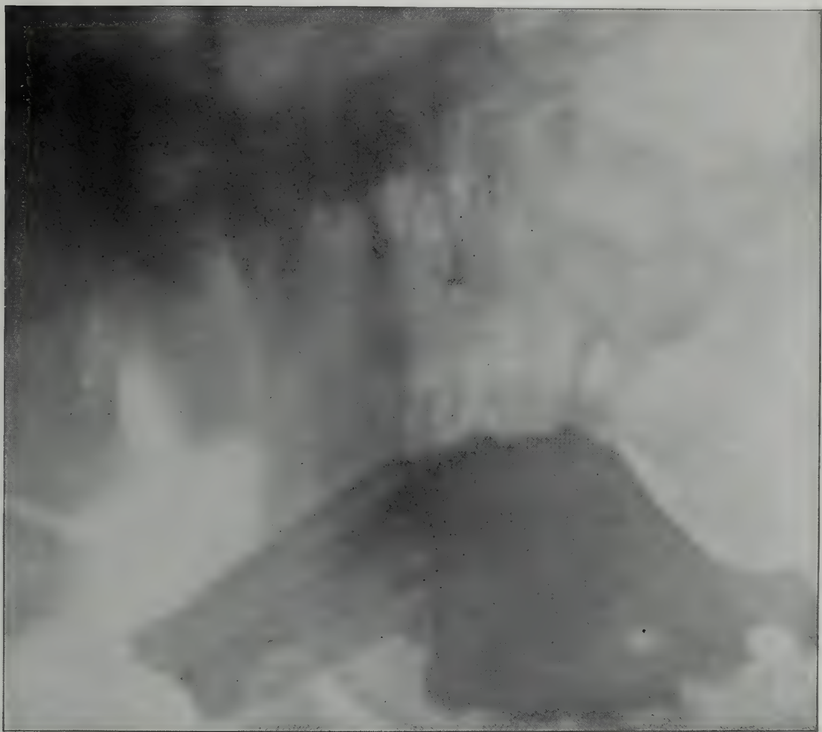
was not sufficient, but that we must have a piece which would both rise and fall. He started to work to make such a piece, making first a solid gold plate to restore the hard palate, which is a simple matter, and which has been done by hundreds of men before. He then attached

to that gold plate, by means of two gold screw posts, a tongue of gold (Fig. 2) fitting in the slot of the gold plate caused by the form of the cleft, the heads of the screw posts projecting into the nasal cavity, where they do no harm and cause no inconvenience. This gold tongue and the soft piece are shown in Fig. 3.

The soft piece is made of palate rubber; we have the dies, and new pieces can be vulcanized and attached to the gold tongue without any inconvenience to the patient. We have also two of the gold tongues with the soft attachment, so that they can be changed frequently, or sterilized from time to time, and in that way they last longer than if we had but the one piece.

This soft piece was made by inserting the tongue of gold in its proper place on the gold plate, and then molding the unvulcanized rubber into shape as nearly as possible, placing it upon the tongue and putting in the mouth, and trying to place it so that the patient could talk and retain the appliance without its gagging him or touching the back of his throat. The thick part of the soft piece was made of two thicknesses of palate rubber; before vucanizing, and after vulcanizing, it was found that it worked perfectly.

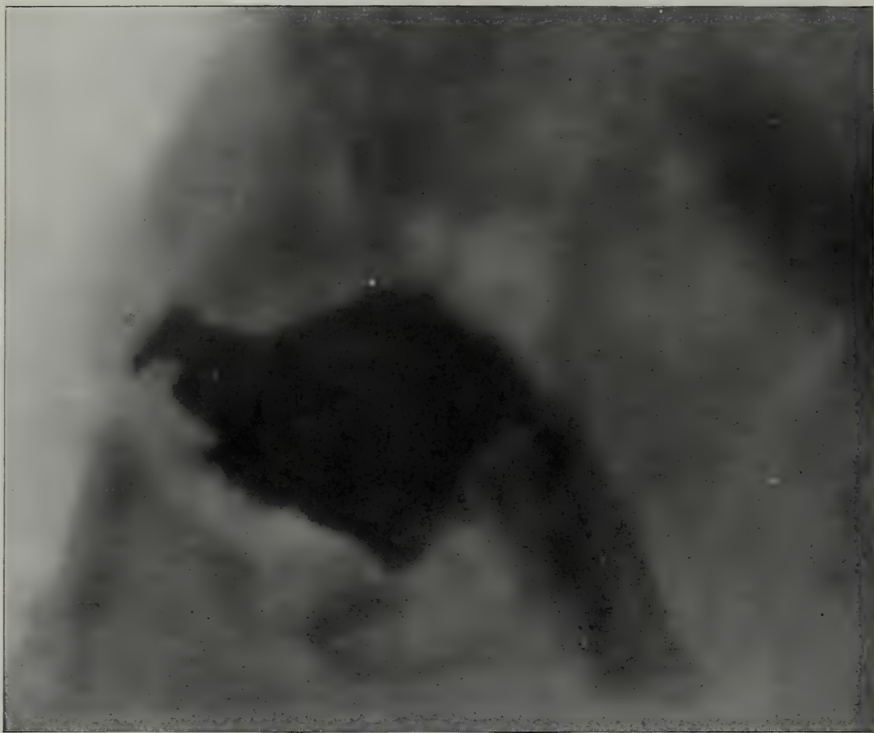
FIG. 4.



The plate with this attachment was placed in the mouth of the patient, giving perfectly satisfactory results. (Fig. 4.) The patient had already had some twenty-odd plates of different kinds made by different dentists in the United States, the most successful of which was made by Dr. Gritman of the University of Pennsylvania. This was a rubber plate extending as far back as the soft palate, but in the region of the

soft palate it was made thick and in the shape of a large collar button, extending into the posterior nares, and around which each division of the soft palate was supposed to contract, and in this way close the opening to the posterior nares. These plates have been made by a number of different dentists and have been described in the dental literature. It was the clinician's opinion that such a plate must have a soft piece, movable both backward and upward to close the posterior nares, and must respond to the contraction of the pharynx, therefore possess a downward and forward movement. After the patient had this apparatus in his mouth, the clinician had some X-ray pictures taken, to verify his supposition. The first picture shows the patient with the apparatus in his mouth, at rest (Fig. 4); the second was an instantaneous exposure taken of the patient with the apparatus in his mouth in the act of swallowing, and, as is seen, the clinician's supposition that, in the act of swallowing, the soft part of the palate goes forward and downward, is absolutely correct (Fig. 5). With this particular piece, in the act of swallowing, when there is solid food in the mouth, the bolus of the food forces the soft rubber upward into the posterior nares, closing these off, so that the food does not force itself into the posterior nares. That it is also not necessary that we close that passage entirely in the act of talking is evidenced by the fact that this patient can talk perfectly well, even if the appliance does not absolutely close the posterior nares, that particular portion being made so as to leave a space of about a quarter of an inch between the posterior wall of the pharynx and the end of the soft palate.

Fig. 5.



In this particular instance, the patient had been operated upon for double hare-lip, and in the clinician's opinion the operation had not been properly performed, for the lip was drawn down tightly against the anterior teeth. He therefore took the patient to Dr. E. A. VanderVeer of Albany, who again operated on the hare-lip, with the result of relieving the drawn condition and giving to the lips more mobility, also producing a marked improvement in the speech of the patient.

The Artificial Restoration of Lost or Missing Tissues in Congenital Cleft Palate. (By Dr. Vethake E. Mitchell, New York City.)

The value of a method by which this class of oral defects are corrected is judged by the result obtained, and the clinician's object in presenting this patient was to show by actual demonstration the possibilities in the improvement of voice and speech by means of an artificial substitute for the missing tissues, and the advantage of such a procedure over surgical operations.

There are two reasons for attempting to correct this defect—(1) improvement in health by permitting the passage of air and food through their proper channels, and (2) the improvement in voice and speech by restoring to the vocal mechanism its missing tissues and their functions.

The palate is one of the most important organs of voice and speech. Its functions are concerned in the forming of the tone of the voice by regulating the size and shape of the resonance chambers, and to close off the nasal passages in the emission of certain sounds.

The vomer bone, that portion of the nasal septum which is, more or less, missing in all these cases, is also a very important part of the vocal mechanism especially concerned in nasal resonance.

Without any question, surgical closure of the cleft would be the ideal method of treatment, if it were possible to restore all the tissues and their functions, but such is seldom the case.

Appliances of many shapes and of different materials have been devised for the closure of the cleft, but with apparently little regard for the restoration of the nasal passages to permit of normal respiration, or the restoration of the resonance chambers for the improvement of voice and speech. In the appliance presented all these features or functions have been taken into consideration.

The first six months of the unfortunate child's life is a very critical period, owing to its inability to receive nourishment.

Some twelve years ago, the clinician devised an appliance which will materially assist them. It consists of a soft-rubber plate covering the roof of the mouth closing the cleft, to which is attached the rubber nipple, either for bottle or breast feeding. (A specimen of this appliance was passed around.)

The clinician then introduced a patient, Miss K., for whom he had made an appliance last June. He passed around the model of the patient's mouth to give some idea of the defective condition of her vocal mechanism. The width of the cleft at the posterior border of the hard palate was 13/16ths of an inch, and the vomer bone was entirely absent, contra-indicating surgical operation.

The appliance is constructed of hard rubber and gold, making it thoroughly hygienic, durable, and non-irritating to the tissues. The plate covers the roof of the mouth, and is firmly clasped to the teeth. The hard palate and vomer bone, are reproduced in hard rubber, vulcanized to the plate; the soft palate, also of hard rubber, is fastened by a hinge so shaped as to be controlled by the muscular action of the palatal tissue.

Without the aid of her appliance, the patient was asked to pronounce some of the most difficult letters of the alphabet: First, the labials—B, P, F, V; then, the anterior linguo-palatals—C, D, S, T; then the posterior linguo-palatals—G, K, Q, and X, Y, Z.

Then an awkward combination, as "sixty-six," and a still more difficult combination, the name of Dr. Norman W. Kingsley.

With the appliance in the mouth, the

patient then repeated this combination, demonstrating a very marked change in the quality of her voice, articulation, and enunciation.

To show that, when the palate is raised by the muscles, the nasal passages are closed and that the breath may be forcibly expelled through the mouth, the patient was asked to blow out a candle. This may seem a very simple matter, but the patient was not able to do this before the introduction of this appliance.

Most appliances that are constructed at the present time are bulbous, or of the plug type, which necessarily interfere with nasal resonance, the appliance more or less filling up these resonance cavities. To show how absolutely important it is to have the nasal passages restored to as nearly as possible a normal condition, the clinician added a piece of wax to each side of the artificial vomer bone, completely closing off the nasal passages, showing the interference of nasal resonance.

The patient then pronounced NEE, NAH, NOH, and ING, N, and M, with and without the obstruction.

To show what is possible with the singing voice, the patient gave a singing demonstration, assisted by her vocal teacher:

(1) Through the development of her breath control, and by a unique card-buzzing exercise, to develop certain phases of the voice, the patient was enabled to blow a steady flow of breath through the lips. To show her breath control, she demonstrated a little exercise in card-buzzing.

(2) Next, the scales of thirteen vowels and thirteen consonants were used. These scales have been arranged so discriminatively in their sequence in vocal art-science that, by their correct use, each and every resonator from the tip of the nose to the epiglottis is exercised, and finally all are correlated or coupled. With the use of the scale of consonants and vowels, all muscles for articulation and enunciation, namely, the lips, tongue, and palate, are exercised and developed, and perfect pronunciation is the result. The patient demonstrated the above combination; to show her breath control and tone quality, she sustained the thirteen vowels at three or four different pitches. Then, to show her use of the scale of thirteen consonants and vowels, she sang them on chromatic scales, and reversed the order of syllables on descending scales.

(3) To demonstrate the practical use of the mechanical appliance, and to show the foremost and highest nasal resonance, the patient sustained the combination of ING, N, M, and prolonged the sound of M to show its position in the singing quality.

(4) To demonstrate the perfect mechanical action of the appliance, the patient sang an arpeggio that moved from a lower to a higher pitch in the ascension. This necessitated a rise and fall of the normal palate, and was perfectly apparent with the artificial palate.

(5) The patient finished her demonstration by singing two short ballads, "Since You Loved Me," by Sanderson, and "A Bowl of Roses," by Coningsby. This was done to show the combination of articulation, enunciation, pronunciation, and also the legato in singing. The latter necessitates perfect breath reistance against the upper incisors, which again, is made possible by the mechanical appliance.

In the training of her singing voice and perfecting of her articulation and enunciation, this patient has had only twenty-six lessons thus far.

An X-ray Photograph Showing an Impacted Lower Second Bicuspid, the Deciduous Molars Being Still Retained in the Arch, and Also Impacted, in a Patient of Thirty Years. (Dr. F. E. Bryant, Rochester.)

A Home-made Instrument for Carving Wax Models in Cast Inlay Work. (Dr. Bernard Fischler, Brooklyn.)

Technique of Making Jackson Appliances of Gold and Platinum. (Dr. C. W. B. Wheeler, New York.)

Orthodontia. (Dr. G. A. Fletcher, Albany.)

This clinic consisted in a demonstration of the application of the new Angle orthodontia appliances, shown by plaster models of practical cases fitted with the appliances. The advantages of wire solder, with drawplates, and instruments for cutting and forming the desired size and shape were also exhibited.

Exhibition of Transplantation of Lower Incisors. (Dr. G. N. Appleton, Albany.)

Repair of Fractured Incisor. (Dr. H. G. Kittell, Upper Troy.)

A youth about twelve years of age presented himself with a broken upper central incisor. The fracture was clean, extending from the gum line on the labial surface to about one-sixteenth of an inch below the alveolar border on the palatal surface, this slight portion of the alveolus, being still fastened to the broken crown, acting as a hinge, and the tooth dropping back of the lower incisors.

The pulp when first seen was dead. The broken crown was removed and preserved in an antiseptic solution, the root-canal treated, and at a later sitting filled. An iridio-platinum dowel was fitted into the root-canal, allowing about three-sixteenths of an inch to protrude. This protruding portion was fitted into the enlarged pulp chamber of the broken crown, and the whole cemented to place. After three and one-half years' service, the tooth looks as good as it did originally, the color remaining as good, if not better, than that of the average devitalized tooth.

Gold Inlay Filling in Combination with Synthetic Cement. (Dr. W. A. Warren, Watervliet.)

The method of procedure demonstrated is as follows: The cavity is prepared in the usual manner as for any inlay; a wax impression is taken, preferably with Taggart's wax, in the usual manner; when completed, the surface exposed to view is carved out with a small, sharp lancet, or, if air-pressure is used, the cavity may be drilled with an inverted-cone bur. The cavity must be retentive to hold synthetic cement. The next step consists in casting and cementing the inlay in the cavity and finishing it; then synthetic cement of the desired shade is inserted.

Immediate Cutting and Grinding of Sensitive Dentin, with the Aid of Chloro-carbolin Obtundent. (Dr S. G. Wallace, Lakewood, N. J.)

The patient, a man of about forty-five years of age, a dentist by profession, of nervo-bilious temperament, overworked and in a highly nervous condition, was much in dread of dental operations, as his teeth were acutely sensitive. At the clinician's request two of the dentists attending the clinic selected a highly sensitive cavity located at the gingival margin on the distal surface of a lower left second bicuspid, approximating a gold crown on the first molar. The difficulty of this operation was increased by the fact that the cavity did not extend to the occlusal surface of the bicuspid. Furthermore, because of the close contact with the gold crown and the lack of a right-angle attachment, the operator was obliged to use a No. 7 handpiece, to make an opening from the occlusal surface by cutting down the enamel and dentin to the center of the bicuspid and into the cavity.

Method of desensitizing. A small quantity of the obtundent was placed in a receptacle; then a pledget of cotton was saturated in the obtundent, placed around and in the cavity, and allowed to remain about five minutes. With a finely cut No. 3 round bur, an opening was made from the distal surface to the center of the bicuspid; then, with a fine cross-cut dentate fissure bur, lateral excavation was made down to the floor of the cavity, after the manner of the Black method of cavity preparation. The burs were continually dipped in the liquid and kept wet with the obtundent while in motion. After a careful examination by dentists attending the clinic, the tooth was found to be thoroughly desensitized, and the patient stated that during the entire operation he had felt no

pain or sensitiveness. The time required for desensitizing the tooth and completing the cavity preparation did not exceed twenty minutes.

CROWNING TEETH WITH PORCELAIN. (Dr. FRANK W. KETNER, Hudson.)

The method of procedure described is as follows: First, the root is beveled as for a Logan crown, then a disk of platinum, No. 29 gage, is made so as to fit perfectly the root to be crowned. The canal is enlarged sufficiently to accommodate the dowel of the Logan crown, a crown suitable for the case is selected, and the front and back are ground away until the center of the crown fits closely around the dowel at the end of the root; the disk is waxed into position, the crown and disk are removed and invested. When ready to go into the furnace, the front and back are filled-in with porcelain and fused. The porcelain crown is put gradually into the furnace, so as to heat the crown before the pin, to prevent fracture. If it is desired to band the root, this should be done first in the usual manner with platinum, using platinum solder; then the operator may proceed in the manner described.

NITROUS OXID. (Dr. H. E. TOMPKINS, New York.)

Dr. Tompkins' clinic consisted in several tests for the purity of nitrous oxid, as follows:

First test. A rough test for purity above 95 per cent. consists in applying a pressure gage to the cylinder, turning on the gas, and noting the pressure. If the pressure is above 790 pounds to the square inch, the gas is condemned as impure.

Second test. The gas is passed through Nessler's reagent to show the presence of ammonia, which gives to the testing solution a light yellow color or throws down a red-brown precipitate.

Third test. The gas is passed through a solution of potassium permanganate to show the presence of nitrites. If nitrites are present, the solution is deoxidized or decolorized.

Fourth test. The gas is passed through a solution of iron sulfate to show nitrites and nitrates. If these are present, the solution turns brown.

THE USE OF ALYPIN AS A LOCAL ANESTHETIC IN EXTRACTIONS. (Dr. A. G. LANSING, New York.)

A 2 per cent. solution of alypin made up in a boric acid solution will keep for months. This preparation has no toxic effects—is harmless as pure water, and, if injected freely into the gums about the roots of the teeth, will produce an anesthetic effect which is perfect, and which will last from five to ten minutes. The advantage of alypin over most other anesthetics is that it contains no cocain and is not a secret formula, the formula being printed on the label. It does not produce sloughing of the gums nor depression of the heart. The clinician has used this preparation for six years, with uniformly perfect success.

MENDELISM AND ITS BEARING ON SOME DENTAL PROBLEMS. (Dr. F. L. STANTON, New York.)

The principles of Mendelism were shown by means of charts and illustrations of Mendel's original experiment on *pisum sativum.* Several histories of families were shown in which the upper lateral incisors were missing. Models of mouths were shown to illustrate the fact that the presence of the extra cusp on the lingual surface of the second deciduous upper molars foreshadowed the presence of this cusp in the first permanent upper molars. The clinician suggested that the absence of laterals and this extra cusp might be due to discontinuous variation, and subject to the laws of Mendelian inheritance. Histories of similar cases were solicited by the clinician, in order that the key to inheritance might further be investigated.

MAKING GLASS BURNISHERS. (By Dr. CHAS. K. BUELL, Buffalo.)

Glass burnishers, for burnishing matrices for porcelain inlays, also for burnishing silicate cements, are made by heating glass rods, three-sixteenths of an

inch in diameter and twelve inches long. in the center, and drawing them apart, leaving a tapering end upon each piece. The tip end is broken off with pliers and reheated to form a ball, the size of which will depend upon the length of time it is left in the flame. While hot, this end may be bent to any desired angle.

A Quickly Made and Antiseptic Temporary Filling. (Dr. Arthur H. Merritt, New York.)

Commercial zinc oxid, when mixed to a stiff paste with oil of cloves, will make a temporary filling which in large cavities in protected places will last for several months, and when carefully employed will effectually seal any treatment in a tooth, including arsenic. If the filling is exposed to direct pressure, the patient should be seen within a few days, as much of the filling will have been worn out through mastication. Its sedative qualities make this material an excellent temporary filling for use in sensitive teeth. Its use will make unnecessary the unsanitary cotton dressings dipped in sandarac, too often seen in the mouths of patients at the present time.

The cavity to which it is applied need not be dry, but simply wiped out with cotton. As a temporary filling for all-around purposes the clinician knows of nothing so satisfactory, as it combines sedative and antiseptic qualities with cleanness and ease of removal.

A Convenient Form of Rubber-dam Clamp. (By Dr. W. B. Dunning, New York.)

A modified rubber clamp was demonstrated, consisting of blunted jaws which, being protected by a thin layer of hot modeling compound, may be adapted to the tooth-neck. This insures a perfect fit about the tooth, hence an even distribution of pressure from the clamp spring, and when the compound has hardened, the appliance will be found to be very rigid. The chief advantage of this device is the fact that it never slips, and the patient is thereby protected from painful impingement upon the gum tissue. This clamp is first applied to the tooth, then the dam, having a large hole, is stretched over it and down into place. The jaws may be conveniently blunted by placing a common clamp on a stick of the size of a lead pencil, then adapting to each jaw, above and below its edge, bits of German silver wire, about 19 gage, bent like little hairpins—one for each jaw—and adapted to the surface of the stick. A touch of soft solder securely holds them in place. The clamp is then spread, the interior surfaces are smeared with hot compound in the way in which sealing-wax is applied, and when this has slightly cooled, the clamp is carried to the tooth and adapted to its place.

Excision and Drainage of Dentigerous Cysts. (By Dr. H. S. Dunning, New York.)

The patient was a young Swede, eighteen years of age, with a large dentigerous cyst in the upper right jaw.

The permanent canine had never erupted, and there was quite a space between the lateral and first bicuspid. The upper jaw was anesthetized with novocain solution containing adrenalin chlorid, and the patient was given one-sixth grain of morphin.

The incision, one and one-half inches long, was made over the alveolar ridge, extending from the lateral incisor to the first molar region. The mucous membrane and periosteum were dissected back from the bone, and the body of the maxilla exposed. With bone-chisel and mallet, the external surface of the superior maxillary bone was chiseled away, and was found to be very soft and thin. A large cavity was exposed after a couple of strokes of the mallet, and a gush of thick, foul pus followed. Pus and blood were sponged away, and more of the thin bone forming the cyst cavity was removed with Rongeur forceps. The cavity was irrigated and sponged out, and it was then found that the entire maxillary sinus was obliterated, and that there was one large cavity extending from the region of the lateral incisor to the second molar, upward to the floor of the nose and the floor of the orbit. The unerupted canine was easily found and removed, also a deciduous canine.

The distinct lining membrane of the cyst was found and removed, and the cavity gently curetted. The apices of the two bicuspids and of the lateral and central incisors were exposed, as they projected into the cyst cavity. The cavity was then packed with gauze saturated with bismuth paste.

Casting of Aluminum Plates by the Vacuum Process. (By Dr. J. Pensak, Brooklyn.)

After obtaining a perfect impression, all relief work is done. The material used in making the model should not be scraped, because the proper smoothness cannot be obtained if the model is tampered with. The compound used in making the model should be any one of the high-grade materials on the market. The clinician used Brophy's Imperial investment compound. After the model is properly made, the exact outline for the plate is marked with a soft lead pencil, and the plate is waxed up in accordance with this pencil mark. A light-colored wax should be used, for the lighter it is the less impurities there are, and therefore the less chance of failure. The wax base-plate is fastened to the model at all points thoroughly. If there is an opening, the investment material will get under the base-plate, and a failure will result. A rim is then made on the labial, buccal, condylar, and lingual sides of the ridge by cutting a strip of wax to $\frac{1}{8}$ inch, and fastening it down on the base-plate so that it forms one continuous strip. The operator must be sure that deep undercuts are formed for the retention of the rubber, also lugs or spurs should be made on the ridge between the inner and outer rims, to help retain the rubber.

The flask for investing is the one made by the Ransom & Randolph Co., who also make the Elgin vacuum casting machine, which was used at the clinic. A wooden sprue block is part of the outfit. This block should be completely covered with a thin layer of wax, except on its flat base. Short strips of wax about $\frac{1}{2}$ inch long and $\frac{1}{4}$ inch wide are cut to represent the gates through which the aluminum will flow. There should be at least four of these strips—the clinician always uses five. It is better to have more or lesser width than few of greater width, because the metal may flow by gravity if the openings are large enough, and failure will result. These strips of wax are attached to the base-plate at its condylar and palatal ends, and to the sprue block within the depression at its narrow end. Care should be taken not to make the combined length of the model, wax gates, and sprue block longer than the length of the flask.

The case is then invested, the model and sprue block are placed into water, and a camel's-hair brush is kept in readiness. The investment material —which may be the same as that used for the model—is then mixed to the consistence of cream, and the flask is poured about three-quarters full. With the brush the investment material is painted into all crevices, until the whole of the base-plate wax is covered thoroughly. The case is pressed gently into the flask with a pumping motion to displace any air-bubbles. After the investment hardens, any superfluous material is trimmed off, making the rim of the base of the flask fully clear. The case is then heated in clean boiling water, until the sprue block comes out easily. The flask is tested on the bed of the casting machine to see if there is perfect suction. The flask is moved around and around, until there is good suction; then, with chalk, the exact position of the projecting knob of the flask is marked, so as not to have trouble when replacing the flask while it is red-hot. Lack of suction is the cause of most failures. To keep the bed of the machine and the bottom of the flask from corroding, both are oiled with liquid albolin before and after using.

Now the flask is heated, very slowly at first, raising the flame gradually. When all the wax is burned out, the flask is covered with a funnel until it is red-hot. At this point the melting of the aluminum is begun, the flame not to be directed on the aluminum itself, because this will affect its usefulness. The machine is placed in readiness and

pumped up to about 25 or 30 inches. Just when the metal is beginning to melt, the flask is placed in its proper position on the bed of the machine. A quick test is made to see that all is right. The crucible holding the melted aluminum is grasped firmly, and the metal poured on to the flask. Just when all the gates are covered, the valve of the machine is opened. The flask and machine are let stand quietly until cool.

Aside from the above description of the casting of aluminum plates, the clinician exhibited artistic aluminum dentures without rubber attachment. The method of making these is as follows:

After the models are properly placed on the articulator, and the shade, length, and width of the teeth secured, properly fitting, diatoric teeth are selected for the bicuspids and molars, and Goslee teeth for the six anterior teeth. Six base-metal pins are placed in proper position to receive the Goslee teeth. On the record card the mold and manufacture of the diatoric teeth to be used are entered. The countersunk part of these diatorics is oiled and pressed into the softened wax. All necessary grinding is done, until the articulation is correct. When all teeth are in proper position, they are removed. It is essential to keep a record of the mold and make, for future reference. By this procedure anteriorly six posts for the Goslee teeth, and posteriorly eight projections for the diatoric teeth have been obtained. In finishing, the same process is used as described above. This plate is not only beautiful, but the teeth are interchangeable, which is a great advantage.

Some Failures in Casting Aluminum. (By Dr. J. Pensak, Brooklyn.)

(1) *Leakage.* This may be due to (*a*) leaky valves of the casting machine, (*b*) imperfect contact between the base of the flask and the bed of the casting machine. The latter may be caused by too much investment material at the bottom of the flask or by corrosion of the metal either of the base of the flask or of the bed of the casting machine.

(2) *Holes in the plate.* This may be due (*a*) to dirt or residue in the mold, left by impure wax, (*b*) to the flask not being hot enough when casting, or (*c*) to the flask being heated too suddenly and chips of the investment getting into the mold.

(3) *Non-fitting plate.* This may be due (*a*) to faulty impression, (*b*) to permitting investing material to get under the wax base-plate while investing, (*c*) to handling the flask before it is cool enough, thereby disturbing the metal before it has set thoroughly, or (*d*) to checks in the investment, caused by investing too long before casting.

(4) *Imperfect casting.* This may be due (*a*) to opening the suction valve before the molten metal has covered all the open gates, (*b*) to opening the valve after the molten metal has commenced to congeal, and (*c*) to the gate openings being too large, and metal being drawn down by gravity before suction commences.

(5) *Satisfaction in wear.* The highest grade of aluminum must be used. The clinician has had success for nearly three years with Aerdentalloy (that is, aluminum about 86 per cent., silver 14 per cent.) made by the Ransom & Randolph Co.

X-ray Measurement of the Unerupted Permanent Teeth at the Age of Five or Six Years to Provide for Early Regulation of the Arch, If Required. (By Sinclair Tousey, A.M., M.D., New York.)

Measurements of the deciduous teeth and of the permanent teeth some years later show no fixed or even approximate ratio between the two. Some of the smallest deciduous teeth are succeeded by the largest permanent teeth. (See Tables I and II.)

Models of the dental arch in these children at the age of five or six, and again five years later, show that the radius of curvature formed by the deciduous teeth is reproduced by the permanent teeth, whether it be large enough for the latter or not. Consequently a child with small deciduous teeth arranged in a beautifully regular curve

(I)

DECIDUOUS AND PERMANENT CENTRAL INCISORS:

Actual width. (Permanent incisors measured some years later.)

(In 100ths of an inch.)

NAME.	Years of age—1st measurement	Years of age—2d measurement	Weight in lbs. at 2d measurement	Right upper central—*deciduous*	Right upper central—*permanent*	Ratio 1 to	Left lower central—*deciduous*	Left lower central—*permanent*	Ratio 1 to
			(lb.)						
Matthew Sweeney .	6	8	. .	25	38	1.52	15	24½	1.63
Clara Tucksmith . .	5	10	85	24	36	1.50	15½	22	1.42
Cecelia Leonard . .	7	9	. .	21	33	1.30	. .	21	. .
Gretchen Winter . .	5	10	73	25	29	1.16	14	19	1.36
Margaret Frutchy .	5	10	72	25½	33	1.25	16½	21	1.28
Florence Fox	5	10	63	25	34	1.36	14	21	1.50
Sissie Reilly	5	10	60	23	36	1.57	11	23	2.09
Jeanette Stevens . .	6	8	. .	22½	31	1.38	. .	. .	. .
Nora Ferguson . . .	6	6	. .	. .	35	. .	. .	. .	. .

This table shows that no reliable inference may be drawn from actual measurements of the deciduous teeth as to the size of the oncoming permanent teeth.

(II)

PERMANENT CENTRAL INCISORS:

Measured radiographically before eruption, and actually, some years later, after eruption.

(In 100ths of an inch.)

NAME.	Tooth (central)	Radiograph (unerupted)	Actual (after eruption)
Matthew Sweeney .	Lt. up.	39	38½
Clara Tucksmith . .	Rt. up.	36	36
" " . .	Rt. low.	22	22
Cecelia Leonard . .	Rt. up.	34	33
Gretchen Winter .	Rt. up.	oblique 29	29
Florence Fox . . .	Rt. up.	35	34
Sissie Reilly	Lt. up.	36	36
Jeanette Stevens . .	Lt. up.	32	32
" " . .	Rt. low.	21½	22

This table shows that the X ray gives reliable information as to the size of the unerupted permanent teeth.

may later show a set of large permanent teeth hideously deformed and impeded in eruption, because crowded into the original small curve. The interference with the eruption of the permanent teeth not only results in dental deformity, but impairs the development of the jaw, the nasal passages, the pneumatic sinuses of the face, and even the base of the skull. The great majority of operations upon the nasal septum and for adenoids and hypertrophied tonsils result directly from this cause.

By means of the X ray, the unerupted permanent teeth have been measured, and the measurements have been verified by the actual measurements some years later.

From these measurements of the unerupted permanent teeth, the curve required to accommodate them is calculated and drawn for the guidance of the orthodontist. It is an easy matter to regulate the deciduous teeth to this curve, and this will surely guide the permanent teeth into proper position as they erupt.

Demonstrating the Use of a High Frequency Current in the Treatment of Pyorrhea Alveolaris and All Congested Conditions of the Oral Cavity. (By Dr. Moore Stevens, Atlantic City, N. J.)

"A high-frequency current is an alternating—oscillating—current in which the frequency is beyond the point of producing muscular contraction." High-frequency currents possess therapeutic power in passing through tissue the vitality of which has almost been exhausted through the encroachment of disease.

The application of the current was made by way of special vacuum electrodes directly upon the diseased tissue.

In pyorrhea we generally have a deposit of calcium around the necks of the teeth, swollen gums full of venous blood, and loose peridental tissue. In the advanced stages we have a deposit of pus in the pockets.

The deposits and inflammation must necessarily be first removed. The swollen gums must be reduced to normal condition by forcing the venous blood into the circulation. This can be done by stimulation of the parts, through the application of the high-frequency current and the special vacuum electrode, as shown at this clinic, directly on the diseased area. The current appears to promote circulation, increase metabolism, and more or less completely restore general harmony to the parts.

The clinician was not in a position to say much about driving medicaments into the tissues with the high-frequency current, but hopes to be able to make more definite statements in this respect later on.

With the proper application of this current, relief from pain can be given in the eruption of teeth, tic douloureux, gangrene, sensitive teeth during menstruation, neuralgia, ulcerated gums—in fact, in any congested condition of the oral cavity.

Treating Pyorrhea by the Aid of Ethyl Borate Gas. (By Dr. W. F. Dunlop, New York, N. Y.)

The ethyl borate gas is generated, while being used, in a machine which the clinician demonstrated. This machine consists of an outside tank, six inches in diameter, fourteen inches high, with a top and bottom. Inserted in the top is another tank two inches in diameter and five and one-quarter inches long, with the bottom concave to the extent of one-quarter inch. The two tanks are connected by a tube, the ethyl borate antiseptic being poured into a cup with a screw cap on. The cup is continuous, with a small tube extending to the bottom of the smaller tank. The large cylinder or tank is filled with this special gas. When the gas is turned on to be used, it passes through a reducing valve, and the gages on each tank show just what pressure is being applied. When the machine is charged right and working properly, the antiseptic will be volatilized, and come through a hypodermic needle perfectly dry. With a tube, four feet long, moisture is produced which, if applied to

the teeth and loose gums, will leave a heavy precipitate well up under the gums.

This is a very mild but powerful antiseptic. The inflamed gums will take the oxygen out of the precipitate, and circulation is restored. This can be seen working; the blue color of the congested tissues disappears, leaving them pink.

After a treatment of this kind, stains and all deposits must be removed from the teeth, without planing the roots; the teeth are polished and the necks tapped and sprayed again; then, if there remain any deep pockets, a "pocket-packer" is warmed and a small piece of it applied against the teeth with the finger. The material is pressed until it fills the space between the teeth, and protects the gingival margin from the saliva. The patients are given a box of this packer, and instructed in its use; they are to have also some ethyl borate antiseptic, to use as a mouth-wash. The mouth must be clean, and all crevices and pockets packed before retiring. This seems to be a pleasure, as the mouth feels comfortable. The whole treatment is painless.

The treatment differs, after the mouth has been made clean, and all pockets look healthy. The machine is charged with forty pounds of gas; the whole mouth is sprayed, and the gingival margins of the gums all around the teeth are gone over with the needle. The gingiva is full of little ducts which lead up into the deeper layers. The gas will find an entrance through these ducts, and will follow them in all directions if there is any inflammation left. It must be remembered, however, that these little capillaries are very weak on account of the broken-down tissues and poor circulation, and when the stagnant blood is oxygenated, the whole condition changes and the tissues commence to be rebuilt; therefore they should be just stimulated and fed at first by one little jet of the gas. When the gas enters the tissues, they rob the gas of its oxygen and leave the solids in the tissues. This causes stimulation, and great quantities of blood are attracted to the parts; the blue color disappears and a beautiful pink results. The circulation stimulates cell growth, and a reproduction of the parts is the outcome, as long as the cell-containing membranes are left intact.

Orthodontia and Orthopedia of the Face. (By Dr. V. H. Jackson, New York.)

Dr. Jackson presented forty models and appliances, illustrating his method of designing and making removable regulating appliances which are readily removed by the patient for the cleansing of the teeth and the apparatus, and showing how the apparatus can easily be arranged for the correction of any form of irregularity of the teeth. The clinician described first his method of anchoring appliances to the teeth by spring clasp attachments, and then his new method of anchoring appliances to the teeth by a locking device.

With the locking device the appliance is anchored to a canine or bicuspid and to a distal molar, on each side of the arch.

The locking device or anchorage portion of the appliance consists first in cementing a collar with a buccal lug to each of the anchorage teeth, the lug being of triangular shape, like a door-latch. To the mesio- and disto-lingual portions of the appliance is attached a wire clasp, shaped so as to pass over the arch at the junction of two of the teeth, and to rest above the buccal lug of the collar on each of the anchorage teeth described. The end of the clasp always terminates in a loop, similar to a small hook, so that, in unlocking the device, one's finger will not be pricked or injured in springing outward the end of the wire clasp; the hooks on the clasps are necessary for holding the rubber equalizing bands.

This anchorage is suitable for supporting the appliance for the treatment of any form of irregularity of the teeth, being especially suited for the equalizing of the upper and lower dental arches in correcting prognathous conditions of the mandible, or for protrusion of the upper arch, rotation of any of the teeth, retention of the teeth, their movement

in the process by the use of "equalizing posts," etc.

The apparatus is adapted for treatment of patients of any age.

With the collection were shown models of the upper and lower dental arches of a child four years of age, before and after regulating. The child had upper protrusion and very narrow arches. With the models were shown a record card and an upper and lower appliance used for correcting the irregularity by the expansion of the dental arches, and the arches were equalized by the use of rubber equalizing bands.

The clinician demonstrated the tracing and record system that he introduced to insure the operator's making a definite measurement of each change made in the apparatus in applying a given amount of force and a definite amount of movement, thus preventing any discomfort to the patient, each change in the apparatus being controlled by measurement, or a step recorded on the record card. Dr. Jackson pointed out that the use of the record card in the manner described makes orthodontia an exact science.

(I) A Method of Obtaining a Perfectly Fitting Gold Crown from the Dental Laboratory. (II) A Cast Crown with Steele Facing to Replace the Richmond Crown in Fixed Bridge Work. (By Dr. D. W. McLean, Mount Vernon, N. Y.)

First the tooth is "prepared," which can seldom be done without devitalizing the pulp. The most simple and expeditious method of removing the pulp is the following: Nitrous oxid and oxygen are administered, and the patient is placed in the analgesic state. The pulp is then exposed with a sharp bur; only the slightest suggestion of pain will be felt. The tooth is then isolated by means of an aseptic doily, and a half-tablet of cocain and adrenalin is applied to the pulp. A piece of cotton slightly moistened with sterile water is then placed over the cocain tablet, vulcanite rubber or yellow wax is placed over this, and strong pressure applied. In the analgesic state there will be no pain, and one strong pressure will be enough. The pulp is then removed, and the canals are reamed. This will consume about ten minutes.

The tooth is now shaped with diamond disks and stones, so that there is a definite taper toward the occlusal surface. Enough should be removed from the occlusal surface to accommodate a crown reinforced not only in the cusps, but also in the fissures, where the stress of the proper occlusion will largely fall.

A dentimeter measurement is now taken, and a narrow platinum band made and soldered. This is trimmed to conform to the contour of the gingival gum margin, and is carefully fitted and burnished to the tooth. The band is then placed in position on the tooth, and a careful bite and plaster impression are taken. The cast is poured, leaving the band in position on the plaster tooth.

The casts are then articulated and sent to the mechanic, who is instructed to make the crown so that it will extend half-way up the platinum band and occlude properly in that position. The crown is then contoured to the band, a piece of solder laid on that joint, and heated with the blowpipe. This soldering is done right on the cast. The finished crown will slip into place without any further grinding or fitting.

(II) The root-canal is reamed, and the root prepared somewhat as for a Logan or other porcelain crown. The enamel is removed with a suitable scaler, from the mesial, distal, and lingual surfaces of the root, and the edges are beveled. With an Ottolengui reamer, the root is faced at a slight incline toward the lingual surface, but not to a point below the gum margin. From the root-canal forward to the facial edge it should be given a more decided slant, to a point *near,* but not *at* or *beyond* the edge of the peridental membrane.

A Steele facing, either anterior or posterior as the case may require, is then ground to a good joint at the cervical margin, facially, and a gold backing applied and fitted to the facing. A piece of inlay wax, heated, is then applied to

the back of the facing and tapered with the fingers to a point, which is pressed into the root-canal, and the facing is pressed into position. It is then removed, and the excess wax trimmed away; it is then placed in the root again, and the edges of the wax are burnished to the tooth, mesially, distally, and lingually, to form a band-like edge.

If the crown is now in its proper position, it is removed once more, slightly softened in warm water, and again pressed into place in the tooth, adjusting it carefully to its proper place.

The crown is then removed from the tooth, the facing is removed, and the casting is made in the usual way. This gives a very strong crown with post, base, and backing cast in one piece, and the post fitting the root perfectly. Coin clasp or twenty-two karat gold is preferred for this work.

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EDITORIAL DEPARTMENT.

NEW WINE IN AN OLD SKIN.

IN our issue for last November we gave editorial consideration to the obverse of this theme in discussing the underlying features of the reorganization plan upon which the activities of our National Dental Association are now being conducted. We contended that the plan should not be condemned without trial, and we made a plea for a practical test of its working because it embodied the judgment of those who, from long experience, were most familiar with the conditions proposed to be met in the plan finally adopted, and because those who have had the largest experience and familiarity with the needs and activities of the N. D. A. were presumably best qualified to determine the desirability as well as the feasibility of the reorganization plan now in operation. We believe that contention to be based upon rational ground, and so believing are willing to accept the consequences thereof, whatever results may develop through experience in the practical trial of

the plan. Nor are we prepared to believe that the foregoing view of the situation is in any degree evidence of a "tendency toward illiberalism in dentistry," or in any sense incompatible with the ideals "of a journal supposed to be in the interest of a broader intellectual life," as our valued friend and correspondent Dr. Truman phrases his view of it in our present issue.

For the moment we are, however, not concerned with the container of the organization plan so much as we are with the contents, and we shall therefore deal with the wine rather than the skin—for, after all, the analogy of the wine and of the skin falls short in view of the fact that whatever of the wine of knowledge or scientific progress in dentistry shall result from the activities of our National Dental Association will be so instantly absorbed by the general body of the profession and the world at large that no skin, old or new, will be needed to retain it, nor indeed can retain it. What is of real importance, then, is the factor of productiveness provided for under the reorganization plan; and within the term productiveness must be included not only the creation of knowledge, but the dissemination of knowledge in terms of professional education. These must be the main authoritative warrant for the existence of our National body; all else is purely incidental.

As we have from time to time pointed out, dentistry has entered upon a new era of development in all of its activities and in all of its relations. A few decades ago the mental attitude of the dental profession was, with minor exceptions, identical with that which had characterized it from its beginning;—the mass of data or the so-called knowledge which constituted the basis of dental education, and therefore of dental practice, was exclusively that obtained by clinical observation, or the equivalent of clinical observation, in that it was purely empirical; and its accuracy, in so far as it was accurate, was sporadic and accidental rather than scientifically exact, for the reason that no proper conception of the scientific method as applied to dentistry existed. The problems of dentistry were not solved, they were guessed at, and the approaches to the truth depended upon the relative precision of the guessing. A most striking example of the domination of the empirical method of reasoning in its application to the solution of an important and very practical question is found in the records

of the wordy conflict that constituted the so-called "amalgam war" which raged with such violence as the result of the activities of Mallan and the Crawcours about 1830, continuing for a series of years thereafter. The most eminent leaders of the dental profession of that time—such men as Westcott, Taylor, Noyes, Rich, Harris, and their colleagues—signed their names to reports of investigations of the properties and effects of amalgam when used as a tooth-filling material that contained observations and conclusions which would discredit the intelligence and training of a first-course dental student of the present time. Teeth filled with amalgam over exposed pulps, resulting in abscess, were recorded as cases of mercurial necrosis, and the attendant inflammatory phenomena were diagnosed as mercurial ptyalism. The elimination of the factor of error from the problem of amalgam—error which had its origin in ignorance of the real data concerned and the emotionalism begotten of the ethical aspects of the question—was brought about by slow degrees and much agony of mind, simply because the methods of scientific investigation were not available, nor had the understanding of the scientific method developed, in the period under consideration, to a point where it could have been applied to the solution of any dental problem.

What was characteristic of the general professional attitude at the time of the amalgam war has, though in lessening degree, characterized much of our professional attitude since that time, until recently a marked change has occurred. The demand for the practical has not grown less, but we are developing a new conception of the meaning of the term "practical." Applied to the realm of what we call knowledge it means precise knowledge, the elimination of error from its admixture with truth. Knowledge so obtained, when related in a systematic and orderly way, is science, and the method by which the truth, or knowledge, is freed from its admixture of error by subjecting our problems to precise conditions of observation for the purposes of study is the scientific method. Not only is the scientific method productive of practical results, but it is the only method by which practical results can be consistently achieved.

It is the recognition of the foregoing point of view that characterizes the attitude of the dental profession today in contradistinction to its attitude toward its problems a generation or less

ago. A belief in the practicality of the scientific method as applied to the solution of our basic problems has taken root, and is bearing its characteristic fruit. A striking evidence of the new attitude of mind is the splendid support that is being given to the research movement by the creation of a Scientific Foundation for the promotion and financial support of scientific research under the auspices of the National Dental Association. It is certainly an index of a changed order of things, as well as practical evidence of "good faith," when the dental profession is willing to financially guarantee the success of such an enterprise. It can mean no less than that we have in the Scientific Foundation Fund of the N. D. A. a material expression of the realization upon the part of subscribers to the fund that the really practical in dentistry, as elsewhere, is the scientific.

It is not so much the fund itself as it is what the fund represents that has called for a reorganization of the N. D. A. on more modern lines of economy and efficiency in its productive work. The time is past when the dental profession can afford to entertain itself by listening to wordy essays that lead to no other conclusion than the Jack-Hornerism of the essayist. The only essayist who can justify his right to claim the attention of his audience for the length of time required to make his presentation is the essayist who has a message of truth to convey to the minds of his audience—who brings an addition, small though it may be, to the sum-total of knowledge. Guessing is losing its popularity, and those who would keep in the line of progress as contributors to our knowledge must seek out the truth, and seek it early, if they are to find it at all.

Organization is therefore necessary, in order, among other things, that time shall not be lost by the presentation of that which is useless because it is erroneous. A committee having authority to censor the matter submitted is also necessary, to eliminate the time-stealing devices of those who seek their own aggrandizement rather than the cause of science. It is quite true that all laws and regulations inhibit in their degree the liberties of individuals, but the liberties of the few must take second rank to the freedom of the mass to progress; and on the face of the matter, at least, it appears that the reorganization plan of the N. D. A. is conceived in the spirit of the progressive tendencies and

methods of the times, and we are therefore of the opinion that the wine in the new skin will surpass both in quality and quantity anything produced under the old-skin *régime.*

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Exodontia: A Practical Treatise on the Technic of Extraction of Teeth, with a Chapter on Anesthesia. By George B. Winter, D.D.S., Professor of Exodontia and Lecturer on Anesthesia, St. Louis University, School of Dentistry. Pp. 409, with 245 original engravings. Price, $4.00. St. Louis: American Medical Book Co., 1913.

It is a matter of regret that this volume, excellent in most respects, should have been marred by an eccentric title. In the attempt to coin a new and "scientific" name for the time-honored practice of extraction of teeth, the author has succeeded in producing a meaningless term that only by a considerable stretch of the imagination can be made to signify tooth extraction. If a more concise term is necessary, we could suggest many other words—for example, "odontectomy"—that would express the meaning more appropriately, and at the same time be more uniform with medical nomenclature. Seriously, though, we see no need for any change from the old-fashioned phrase "extraction of teeth."

While the claim is true that the author has produced a more extensive treatise on extraction of teeth than has heretofore been published, yet there is no ground for the implication that there are no other books that cover the subject adequately, nor for the statement that works on operative dentistry refer to it only briefly. There have been already several excellent works devoted exclusively to the extraction of teeth—for example, that by Colyer—and the subject is covered with sufficient detail in the "American Text-book of Operative Dentistry."

The various forceps, elevators, and other instruments used by the author are minutely described, after which the operations of extracting individual teeth are taken up in detail. The methods of dealing with various anomalies are also given close attention. A special chapter is devoted to the operative treatment of impacted third molars. The author strongly disapproves of ever extracting the second molar to facilitate the removal of the third molar or to allow space for it to erupt. While in most cases presenting the treatment should consist in removal of the third molar, yet as the operator gains in experience in these cases, his tendency toward extracting the second molar increases. In the operation described for removal of an impacted third molar, it would appear that there is considerable danger of injuring the lingual nerve in cutting away so much of the internal alveolar plate, as this nerve runs very close to the lower

third molar. In discussing the etiology of impaction the author somewhat confuses the cause with the condition present.

For patients affected with neurasthenia or other nervous disorder, prior to undergoing dental operations potassium *iodid* in 10-grain doses, taken three times daily, is advised. We believe that potassium *bromid* would be more efficacious in these cases. Also, the use of a solution of 5 grains of potassium permanganate to the ounce of water as a mouth-wash seems rather strong; no wonder it has a disagreeable taste. The patients would not object to a 1 : 3000 solution, which would be quite as effective.

There is a chapter devoted to accidents following extraction, and another to after-treatment. The section on office equipment will be found useful to those making a specialty of this work.

We are pleased to note the recommendation that the first procedure in acute septic pericementitis is extraction of the offending tooth. The sooner the dental profession in general recognizes this elementary surgical principle, the fewer will be the cases of osteomyelitis and septicemia following dental lesions. Very elaborate treatment is described for the sinuses leading from abscesses about the roots of teeth to the external surface. In a case of this kind the sinus usually heals after extraction of the tooth without any after-treatment whatever.

In the chapter on anesthetics, while the various general and local anesthetic agents in use in the extraction of teeth are spoken of at some length, the author does not give in sufficient detail their contra-indications and directions for practical use. An expression of his preference in individual cases would have added value to the chapter.

The minutest details of instruments and operations are beautifully illustrated throughout. Almost every conceivable form that each individual tooth may take is shown by photographs. The upper teeth might better have been presented in the position in which they appear in the mouth, with the roots above and the crowns below.

While we have laid considerable stress upon some of the faults of the book, taken altogether the author has well succeeded in presenting a valuable work on the subject.

The publishers deserve the greatest praise for producing a piece of book-making of the highest type.

R. H. I.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Beitraege zur Klinischen Chirurgie*, Berlin, vol. xxv, Nos. 1 and 2.]

TOTAL RESTORATION OF THE MANDIBLE. By Prof. Dr. Riegner, Breslau.

This work, which has been dedicated as a memorial of the Breslau Surgical Clinic to the University of Breslau on the occasion of its centennial, marks not only an important achievement in surgico-dental prosthesis, but, owing to the scientific thoroughness with which the muscles of mastication before and after restoration of the mandible have been studied anatomically and histologically, is of the greatest interest to medicine and dentistry alike. Riegner states that in total extirpation of the mandible, the median incision through the lower lip, in conjunction with the incision carried along the inner mandibular edge, is the one which promises most results, as it affords a complete survey over the condylar cavity, and in malign tumors facilitates their radical removal. He recommends, first, the employment of an immediate prosthetic apparatus of rubber, and afterward only the insertion of a final light prosthetic apparatus of metal. Light prosthetic appliances, in total restoration of the mandible, are always to be preferred to heavy ones. For the temporary appliance he finds black vulcanite rubber the best, while for the permanent restoration hollow platinum alloys heavily gilded are given the preference.

Riegner concludes with a most significant comment on the relationship of medicine to dentistry. "The connection," he says, "of the medical sciences, the necessity of preserving this connection as far as possible, notwithstanding the unavoidable, ever farther-reaching specialization, is generally and unconditionally recognized by the representatives of medical art and science; and yet, although this demand is little opposed theoretically, practically the necessity of uniform co-operation and mutual support has not been recognized always and everywhere." He points out that works like the one before us afford convincing proof of how little dental science can do without surgery, and inversely, how little surgery can do without the help of dental scientific work. Many a surgical method in the treatment of mandibular resections is still employed in an endeavor to make the surgical work as far as possible independent and separate, because it is believed by some surgeons that they can do without the dentist's help. This attitude, however, is wrong in view of the severe demands which, today more than ever before, are made upon technical and scientific work. Dentistry, without far-reaching surgical support, would not, in its most difficult tasks, have made the remarkable progress which has been recorded in its most difficult domains. "The great masters of surgery have gladly recognized this, and in their work have laid stress upon the preparatory and executive assistance of the dentist."

[*L'Odontologie*, Paris, September 30, 1913.]

TEACHING ART IN DENTAL SCHOOLS. By J. Nolin, Montreal.

Since dentistry is divided into two parts, one purely medical and biological, the other strictly technical and prosthetic, and since the latter part can either be practiced mechanically or elevated to the level of an art, according to the dentist's conception of his profession, it becomes, in the writer's opinion, the duty of the dental school to instil into the student an appreciation of the principles of esthetics that enter into the technical part of his work. The lack of all education in art and the undue emphasis laid upon the manual and technical training of the dental student tend to foster in him

purely mercenary ideals, by which the truly ethical and scientific spirit is entirely stifled. Instruction in the fundamental principles of designing, sculpture, and morphology, such as is given for two years in the curriculum of the Dental School of Paris, is advocated by the writer for every dental school, in order to fit the future practitioner to make dental restoration not only with an eye toward mechanical perfection and usefulness, but also toward esthetic appearance, which in some respects is no less important.

[*Schweizerische Vierteljahrsschrift fuer Zahnheilkunde*, Zurich, No. 1, 1913.]

THE CAUSES FOR FAILURES IN CROWN AND BRIDGE WORK. By Dr. Kuhn, St. Gallen.

The writer has had opportunity to examine prosthetic appliances that had been made by operators from almost every part of the world, and has kept statistics which show a remarkably high percentage of unscientific and poor work. Among 112 crowns, for instance, only 24 were passable, the reasons for these failures being the usual ones, viz, inaccurate grinding, poorly fitting bands, faulty articulation, etc.

The writer does not advocate the unconditional devitalization of the abutment teeth, since spontaneous death of the pulp, in his opinion, never occurs in a carefully prepared abutment tooth, which after a short time loses its sensitivity to thermal changes. Among other routine methods, he condemns the taking of the measurement of the abutment by means of ligature wire, owing to the painfulness of this procedure and the injury inflicted by it upon the peridental ligament. He rejects ready-made and seamless crowns, which always require considerable changes for adjustment. Among pivot teeth he accepts only the Richmond crown, the band of which, if visible, he considers no more objectionable than a small gold filling. Failures, to his mind, are always due to incorrect calculation concerning the strength of the abutments and neglect of strains and stresses. Saddle bridges with only one abutment are contra-indicated; a dummy, however, can be supported by any one firm anterior tooth including the second bicuspid, and even a molar dummy can be attached to two bicuspids. Window crowns invariably spell failure. For extensive bridges, Richmond crowns are the best for abutments. Gold inlay abutments alone, on the other hand, are unreliable and therefore contra-indicated.

[*American Journal of Pharmacy*, Philadelphia, December 1913.]

THE PRESERVATION OF HYDROGEN DIOXID BY MEANS OF ACETANILID. By A. M. Clover.

During the past few years, it has become an almost general custom to add a small quantity of acetanilid to solutions of hydrogen dioxid in order to prevent the decomposition ordinarily taking place. This very remarkable property of acetanilid has made it possible for manufacturers to place upon the market a dioxid solution that retains its strength for a long period of time, and has eliminated almost entirely the danger arising from decomposition.

There has been some discussion as to the necessity and justification for the use of acetanilid, and the claim has been made that the instability of the commercial dioxid solution is brought about by certain impurities, which are introduced during the process of manufacture, and that were the method of preparation so controlled as to eliminate these impurities, a stable product would result. In view of the greatly increasing use of hydrogen dioxid—which has, however, been frequently discountenanced as being unsuitable for a great many cases in dental practice—this question is one of considerable importance, and the writer's experimental work has been designed to bring out the facts relative thereto. It has been found possible to prepare a chemically pure solution of hydrogen dioxid in sufficient quantity for experimental work. From a study of the behavior of such a solution, the writer was able to arrive at very definite and indisputable conclusions concerning the effects of various impurities and of acetanilid upon the dioxid.

Six series of experiments were made concerning the effect of several acids and salts, of acids in different strengths, and of various salts, alone and with acetanilid, in solutions of 1/100 normal in HCl, in H_2SO_4, and in H_3PO_4, which showed up commercial dioxid very well, and proved beyond question the usefulness of acetanilid as a preservative of hydrogen dioxid. As to the mineral impurities, the salts of the alkali and alkaline-earth

metals, and all other salts used, except those of copper and iron, appear to have no influence whatever upon the stability of the solutions, when acetanilid is used. Traces of copper and iron have a very deteriorating effect, but this is prevented to a great extent by acetanilid. The concentration of iron used was considerably greater than that which need be present in a commercial solution. Without acetanilid, silica appears to have a deteriorating effect, but this result is almost neutralized by the preservative.

[*Zahnaerztliche Rundschau*, Berlin, April 27, 1913.]

THE OCCUPATIONAL DISEASES OF DENTISTRY. BY DR. E. BAEUMER, BERLIN.

Dentistry, like every other vocation, exerts certain physical and mental influences upon the practitioner which deserve the closest study, since they determine efficiency and even duration of life. The amount of nervous energy spent by the dentist needs no special mention; the more nervous the patient, the more composed the dentist must be, which necessitates an undue amount of self-control and expenditure of nerve force.

The pressure of work, which is usually accentuated during meal hours, prevents most dentists from taking their meals with proper leisure, or from resting for a short time before resuming their task—all of which is so important for maintaining normal digestion and preventing neurotic and gastric disturbances. Night-work is detrimental to the brain-worker, because the excitation of the nervous system persists for quite some time after the work is laid aside, and prevents healthy sleep. For this reason, a change in the subject of thought or in the nature of technical work is most desirable, and the cultivation of some hobby, no matter how insignificant, most recommendable.

Eye-strain and its numerous sequelæ are most frequently experienced by dentists. The conjunctiva becomes the seat of acute or chronic inflammation due to working in poor or in excessive light, to bad air, atoms of infected saliva, and dust from burring carious dentin—all these factors being a continual source of irritation. Trauma of the eye is not infrequently produced by flying tooth fragments.

The attitude of the body in operating impairs circulation and favors hyperemia of the brain, accompanied with headache, malaise, fatigue, etc. Continual stooping, has in some cases produced lordotic albuminuria. The preference given to one foot in standing and treading the dental engine is responsible for cases of varicose veins, pain in the hip and knee joints, and flatfoot. This posture also influences the heart and lungs, and owing to the continued compression of the stomach and the intestines, leads to gastric disturbances and chronic obstipation.

The air which the dentist breathes is usually laden with all kinds of medicaments in atomized form, such as ether, chloroform, phenol, iodoform, exhaled air, gas, perspiration, etc. The danger resulting from mercury vapors is especially great (see also DENTAL COSMOS, June 1913, p. 652, "Mercury Contained in the Air Surrounding Medical Men and Dentists, and Its Danger"), while, in the laboratory, sulfur vapors from the vulcanizer, metal vapors, and metal, pumice, and other dust, are inhaled continuously, leading to chronic bronchitis or other diseases of the respiratory organs.

The contact of the hands with drugs of all kinds, especially formalin, may lead to serious dermatitis, that may temporarily or permanently disable the operator. (See DENTAL COSMOS, September 1913, p. 957, "Formalin Eczema of the Fingers," and "Occupational Dermatosis in Dentists, Caused by the Use of Tricresol-Formalin.") Owing to the necessity of frequent washing of the hands, the selection of a proper neutral soap, thorough drying, and regular treatment with salves and creams is of paramount importance to avoid irritation and infection of the hands.

The application of the radiograph has opened a new source of danger to the dental operator, and protection against X-ray burns must not be neglected.

The dangers to which the patients expose the dentist are chiefly tuberculosis, which may be transmitted by way of the so-called drop-infection through the inhaling of the patient's breath, or by local infection of the skin in the form of lupus or tuberculous warts, and syphilitic infection, which needs no special emphasis.

It would be interesting and valuable in regard to prophylactic measures to collect histories of cases of the manifold diseases which

have been acquired directly and indirectly by dental practitioners in the exercise of their profession.

[*Le Laboratoire et le Progrès Dentaire*, Paris, November 2, 1913.]

THE SEPARATION FILE. By H. Léger-Dorez.

The separating file is useful for the purpose for which it is intended, especially in the anterior teeth, even up to the first molar. In the writer's opinion, it is far preferable to disks, which, no matter how large, do not reach to the cervical margin, and, if small, produce only incomplete or defective separation. The most handy form of separating files is obtained by cutting the files as sold into pieces of from three to four centimeter length, and dipping one end in hot sealing-wax. These small files can be easily manipulated in the interstitial spaces. In a great many cases, files which cut only on one side are preferable. The handle of sealing-wax is better than one of lead or fusible metal, which soil the finger-tips and cause slipping of the fingers, while the sealing-wax slightly adheres to the fingers, enabling perfect control of the file.

[*Oesterreichische Zeitschrift fuer Stomatologie*, Vienna, No. 11, 1913.]

TREATMENT OF PYORRHEA ALVEOLARIS. By Dr. W. Wallisch.

An interesting description of a therapeutic procedure in pyorrhea alveolaris as followed by the writer is given, which may be summed up as follows: If the patient presents with a badly neglected mouth, the mouth is first cleansed, the pus is pressed out with the fingers, the pockets are syringed out, and charged with pulverized silver nitrate, if necessary twice, rarely three times. As soon as the acute symptoms of inflammation in the gingivæ have somewhat subsided, the pockets are tamponed, after having been dried with cotton pellets dipped in concentrated carbolic acid. When, in consequence of this treatment, the teeth have become sufficiently accessible, they are scaled and polished. Post-operative treatment consists in cleansing any exposed roots and touching the pockets with silver nitrate. The patient is dismissed from observation when no more pockets are present. The technique of the application of pulverized silver nitrate is described as follows: A fine, curved sound is dipped in concentrated carbolic acid and charged with pulverized silver nitrate, then introduced into the pockets, this process to be repeated in every pocket. After treating one or two teeth in this way, a water syringe is employed, or the patient is requested to rinse with ordinary water. If the gingival tissues are highly inflamed, tincture of iodin is painted around the teeth, and dried with a hot-air syringe.

The writer has little faith in constitutional treatment, such as Carlsbad salts or Carlsbad water, since even in cases of treatment of this kind, new calculus is found to be deposited upon the teeth.

[*Presse Médicale*, Paris, April 23, 1913.]

HYDROGEN DIOXID IN ASSOCIATION WITH COCAIN OR NOVOCAIN. (MARMOUGET'S METHOD.) By G. Mahé and P. Vanel, Paris.

In order to test the method of local anesthesia indicated by Marmouget of Bordeaux, the writers have made numerous subcutaneous injections of cocain or novocain and perhydrol, ordinary official hydrogen dioxid being too unreliable in regard to its strength, purity, etc. In preparing the liquid to be injected, 4 cc. of a ½ per cent. cocain or a 2 per cent. novocain solution are poured into a sterile porcelain or nickel dish, and one drop of perhydrol is added. The liquid is then heated to boiling-point. For injections, any dental syringe is suitable if mounted with a platinum or nickel hypodermic needle, steel being too quickly attacked by the hydrogen dioxid. The liquid should be tepid, which renders the injection less painful and more easily tolerated by the tissues, and the injection should be made slowly and superficially. The mucosa immediately swells slightly and becomes blanched. As soon as the wheal and the ischemia surround the tooth entirely, sufficient anesthesia is reached. Rarely more than 1 cc. need be injected. About one hundred extractions of all sorts were made, and but little post-operative hemorrhage—a moderate amount of which is most desirable—was observed. The writers claim for this new method the following advantages: Increased power of the anesthetic employed; excellent hemostatic effect of the solution without the disadvantages of the suprarenin; reduced toxicity owing to the use of smaller doses, and absence of immediate or post-operative

after-effects. Especially in nervous or aged persons, children, diabetics, in pregnancy, and in all cases of idiosyncrasy, this method, in their opinion, is indicated. For deeper injections, however, and especially for conductive anesthesia, the combination of the anesthetic with suprarenin is far preferable.

[*Proceedings of the Royal Society of Medicine*, London, May 1913.]

THE CURE OF MOUTH-BREATHING. BY W. W. JAMES.

While in most cases of mouth-breathing, operative or orthodontic measures, followed by breathing exercises, are adopted, mouth-breathing, as is well known, persists in some instances, especially at night, when volition is in abeyance. Strapping and bandaging in such cases is usually unsatisfactory. Nasal dilators (see DENTAL COSMOS November 1913, p. 1149) and similar appliances have been devised, one by Dr. H. Newell (see DENTAL COSMOS April 1913, p. 457), which seems almost the prototype of Dr. James' appliance, and once more curiously illustrates the simultaneity of similar inventions independently. Dr. James' apparatus consists of a wire frame of German silver, gilded after completion, over which thin sheet rubber is stretched. The apparatus is placed at night inside the lips and cheeks, resting upon the labial surfaces of the teeth and gums, and renders mouth-breathing quite impossible. An accurate model of the jaws, extending as far back as the first molars on either side, is essential if the wire frame is to be a success. The frame consists of two horizontal wires, the upper one dipping down in the median line to form a depression corresponding with the frenum labii, and five vertical wires, one in the median line, two at the end and two in the canine region, all soldered to the horizontal wires, and imparting sufficient rigidity to the appliance. Abrasion of the mucous membrane is avoided by making the frame fit accurately. The patient himself will, upon instruction, be able to change the rubber cover.

Such condition as gingivitis and pyorrhea alveolaris, according to James, are markedly improved by the use of this apparatus. Chronic sore throat and nasal catarrh are also sometimes greatly benefited. The apparatus should be worn until normal respiration is quite established, when it may be left off on alternate nights, and later completed.

As far as mechanical construction is concerned, the apparatus of Dr. Newell referred to, deserves the preference.

PERISCOPE.

Arresting Hemorrhage Following Extraction.—In post-operative bleeding, a tampon of cotton saturated in a five per cent. solution of iodin in chloroform is introduced into the empty alveolus, inducing prompt arrest of the hemorrhage.—*Dental Surgeon.*

Engine Mallet for Vibro-Massage.—The engine mallet will be found useful for vibro-massage by attaching to it either a large foot-plugger covered with rubber dam, or better, a screw plugger that will receive a wide-ended rubber button. The strength of the blow should be regulated so as not to be too heavy.—F. BYRNE, *British Dental Journal.*

The Use of a Cataract Knife for Opening an Alveolar Abscess.—A cataract knife is the best instrument for opening an alveolar abscess. The point is so sharp and delicate that its insertion is practically painless as compared with knives in general use for this purpose.—F. E. CLINITE, *Dental Digest.*

An Aid in Inserting Silicate Fillings.—When inserting silicate fillings, time can be saved while the material is setting by folding the rubber dam over the incisal edges of the teeth, over which it has been placed, and tying it there with floss silk. This will insure the filling being kept dry, and will allow of other work being done in the meantime.—*N. J. Dental Journal.*

Liquid Green Soap in Polishing Plates.—Liquid green soap can be used for moistening the felt cone and brushes in polishing plates, thereby avoiding the flying of pumice. Green soap is also excellent for cleansing the hands.—*Ash's Wiener Vierteljahrs-Fachblatt.*

Paper Cups as Plaster-Mixing Bowls.—Sanitary paper cups, instead of being thrown away after they have been once used, can be used as plaster bowls for mixing investments for inlays, etc., then thrown away with their burden of unused waste plaster.—*Dental Dispensary Record.*

Removing Tightly Wedged Cotton from Root-canals.—Cotton wedged tightly in root-canals can be removed by a few revolutions of a Downie or Kerr broach-reamer in the handpiece, withdrawing it the moment it comes in contact with the impacted cotton.—K. K. CROSS, *Dental Digest.*

Facilitating the Polishing of Small Appliances.—If a fine metal or rubber appliance which is difficult to hold is to be polished, it should be invested in plaster after previously filling all undercuts with wax in order to avoid the breaking-off of teeth in removing the appliance from the plaster. This method facilitates the polishing of very small rubber appliances, which are often bent by the heat of the brush.—CHIBRET, *Sud-Est Dentaire.*

Ascertaining Perfect Cavity Preparation in Cast Gold Inlay Work.—Before taking an impression of a cavity, a good test of its correctness can be obtained by some softened gutta-percha being pressed well home, and if it withdraws without a break then one can proceed with the wax pattern. It is most annoying, after carving-up cusps and getting good contact points, etc., to find that the pattern will not draw out.—J. POLACK, *Commonwealth Dental Review.*

A Quick and Efficient Method of Adding One or More Teeth to a Vulcanite Plate.—While the patient is in the chair, a retention is drilled in the vulcanite, a suitable tooth selected, some wax pressed into the retention, and the tooth placed roughly into position. The wax is then warmed and the plate placed into the mouth. While the wax is still soft, the tooth is pressed into position. The whole is syringed with cold water, removed carefully, invested in the usual way, and vulcanized. By this method one saves time, obtains a correct occlusion, and is sure of a good fit.—E. K. SATCHELL, *Commonwealth Dental Review.*

A Handy Root-canal Broach for Posterior Teeth.—For removing the pulp from and treating the root-canals of posterior teeth, ordinary broaches frequently prove too long for convenient manipulation. A way out of this difficulty consists in cutting off an ordinary broach to such a length that it will reach to the apex of the roots while protruding sufficiently from the root-canal to allow of manipulation. Cotton is tightly wrapped around this protruding end, which is dipped in hot sealing-wax several times. In this way a very handy broach is obtained, which can be manipulated between thumb and index finger.—CHIBRET, *Sud-Est Dentaire.*

Smoothing Surfaces of Porcelain Teeth or Inlays.—In the important detail of smoothing the cut or roughened surfaces of porcelain teeth, inlays, etc., all that is required, after suitable shaping with the lathe or engine stone, is one or two grades of ordinary emery cloth. The rough porcelain surface is simply rubbed over for about one minute with a small piece of emery cloth held in the fingers. The inequalities and sharp edges are rapidly smoothed down, and by finishing up with the finer grade emery, quite a sufficient polish may be given, without resort to lathe buff, pumice, or putty powder. Of course, glass-paper or sandpaper will not do the work, emery appearing to be of just the right degree of hardness, and preferable even to carborundum. Those who have not yet tried this method will be surprised at its quickness, simplicity, and effectiveness.—*Dental Record.*

Reimplantation of Teeth.—In all tooth implantations it is absolutely necessary that the implanted tooth be in perfect articulation. The reason for this may be that only perfectly articulating roots which are normally engaged in the masticating process maintain the stimulation necessary for a sufficient blood supply, while teeth which do not articulate fall out. The alveolus must firmly grasp the tooth, which is pressed into it with some force. The tooth to be replanted is laid in a weak borax solution for about thirty minutes, and the alveolus rinsed with the same solution until hemorrhage subsides. After the tooth is replaced properly in its alveolus and firmly ligated, an impression is taken, and a rubber piece with two clamps is made to perfectly retain the tooth. Silk ligatures are not indicated for this purpose. The articulation is temporarily raised by a cast aluminum splint, until the replanted tooth has become firm.—*Revista Stomatologica*, per *Ash's Monthly.*

The Use of a Core in Impression-taking.—The use of a core in taking impressions from the mouth will now and again render a difficult operation comparatively easy. Occasionally one gets a lower case with overhanging molars, forming strong undercuts, which hold the impression material, causing bad dragging and pulling from the tray, and producing a distorted model of the teeth. A case of this sort may be treated successfully in the following way: Obtain a model from a rough impression, and wax up the molar presenting the greatest undercut. If it is a forward leaning second molar, a hood-shaped cap of wax is made, covering the sides and well over the crown; this is cast in tin. In using, a little soft impression material is placed under the cap, and pressed well on the tooth, where it will stay firmly fixed to form the core; the complete impression is then taken, including the core. When hard, the impression material is removed with the tray, and in the process the core separates and allows play, so that removal from lesser undercuts about other teeth is facilitated, enabling easy withdrawal from the mouth. The core is placed back, and any little deficiency at the joint made good by filling in with wax; then the model can be cast in the ordinary way.—H. J. Trude, *British Dental Journal.*

Glycerin in the Treatment of Complications Following the Use of Arsenic.—Certain complications, says Mr. W. W. James, in the *Royal Dental Hospital Reports,* may arise from the use of arsenic. The tooth may become tender and remain intractable to treatment; this is, I believe, due to the persistent nature of the drug, for it is certainly relieved by the use of a glycerin dressing; glycerin being a solvent of arsenic. I felt convinced that arsenic persisted for a long time in the tissues, and in a case which would not settle in spite of treatment, and in which I was informed that several arsenic dressings had been applied, I looked up the drugs which dissolved arsenic. Glycerin was among them, and rapidly effected a cure when used as a dressing. It is quite possible my explanation may be wrong, and that a process of diffusion may have aided drainage. Cases of irritation by arsenic are not common, but I should be interested to hear of any cases which react to this treatment. Leakage on to the gum and alveolar margin can be treated by the patient placing pledgets of wool soaked in glycerin between the teeth or in the cavity, the root-canal being plugged only at the opening.—*Dental Brief.*

Early and Modern Views Regarding Dental Caries.—That the solvent action of acids is to a greater or less degree a factor in the process of dental caries is by no means a modern theory; indeed, among the earliest records we find evidences of the currency of a belief in the acid origin of tooth decay. The empirical use of sodium bicarbonate as a sedative application for the relief of toothache is also a practice of some antiquity, and it is interesting to note that in a "System of Dental Surgery," by Samuel Sheldon Fitch, M.D., published in New York in 1829, the author recommends the use of sodium bicarbonate as an ingredient of dentifrices, valuable because of its power to remove "a filthy and disordered state of the gums," and "to dissolve the thick clammy mucus, especially in fevers." The explanation of the action of sodium bicarbonate in allaying odontalgia from pulpitis he attributes to Dr. J. Green, professor of chemistry in Jefferson Medical College, Philadelphia, of whom he says that—"In his lectures upon the super-carbonate of soda he mentions its useful qualities in removing the toothache, which he considers to depend upon the formation of an acid within the carious portion of the tooth and acting upon the nerve; the alkali neutralizes the acid and thereby removes the pain by removing the cause."

Cause of the Breaking of Facings from Backings.—The breaking of platinum pin facings from backings is commonly, but wrongly, attributed to either physical or mechanical factors. It is due to chemical phenomena taking place in soldering the facing and backing together, but especially to the action of heat. The breaking of platinum pins is most commonly brought about by an agent which has transformed the hard and fibrous metal into a crystalline and fragile one. Though neither air nor heat induces oxidation of platinum, and platinum is not attacked by any acid, there are nevertheless certain substances with which it unites at a relatively low temperature, and it is specially the contact with easily-reducible metals that endangers the pins. Certain solders and even some investing materials contain base metals, such as iron, antimony, tin, and zinc, which in uniting with platinum under the blowpipe bring about its fragility. Carbon is another agent which attacks platinum, and this cause of the trouble is the more important, as many sorts of wax not rarely contain resin or other impurities which, by the heat of the blowpipe, are transformed into carbon.—*Laboratoire et Progrès Dentaire,* per *Dental Surgeon.*

Alveolar Abscess with Fatal Termination.—A case recently treated at the Kent and Canterbury Hospital of alveolar abscess arising from a deciduous tooth, followed by general septicemia and subsequent death, is of exceptional interest owing to the grave sequelæ proceeding from an apparently trivial and commonplace ailment.

F. M., age nine, son of a laborer, attended the dental department of the hospital. His left cheek was swollen, and on the buccal surface of the gum over the root of the lower second deciduous molar, which was carious, was a small gumboil.

His general appearance was that of a weakly child, but his mouth did not seem to be in a more unhealthy or unclean condition than is usually found in children of his class.

The tooth was easily removed, and on leaving the hospital he was instructed to rinse his mouth frequently with hot water during the next day or two. The forceps used for the extraction were sterilized previously. The following are the notes of the house surgeon:

On admission to the hospital the patient was unconscious, temperature being 102° F., troublesome cough and very foul breath, left cheek swollen and painful, and jaw rigid. On examination moist râles and impaired resonance over lower lobe of right lung. Though the local condition of the jaw cleared up in two days under fomentations, the general condition grew progressively worse, and symptoms of meningitis supervened. The child died. Post-mortem revealed septic pneumonia of right lung, principally lower lobe, and purulent basal meningitis.—R. S. N. FARO, *British Dental Journal.*

Tooth-drawing in Days Gone By.—"To lie like a tooth-drawer" (*mentir comme un arracheur de dents*) is an old yet current French phrase, and like many popular sayings, has an interesting and historical origin. M. Bouchot, in his "Histoire Anecdotique des Mêtiers Avant 1789," states that in the days of Good Queen Bess the dental art in France had passed entirely into the hands of the operators, who attended fairs and markets in plumed hats, swords, and spurs, and whose "painless" operations were fearful and wonderful to behold. Courval, in his "Satire," relates how one, while chattering to the crowd—"subtly slipped a little narcotic or stupefying powder to calm the spot and render it without sensation." This is, perhaps, the first instance on record of local dental anesthetics, but what is still more remarkable is that "With the other finger he applied a marvelous caustic powder, which was of such sudden effect that in a moment it made a hole in the gum, and so loosened and unrooted the tooth that it came out as soon as he touched it—sometimes before." Lest sufferers from toothache should moan for the "good old times," when such marvelous powders were obtainable, let us haste to complete Courval's picture, and show how these powders finished their work by making all the other teeth fall out one by one. "Thus," cheerfully concludes Courval, "it is much worse to fall into the hands of empirics than into the claws of the carrion, for these only feast on the dead, while charlatans devour the living." The outward and visible sign of the fair-dentist's profession was a necklace of hollow teeth strung on a cord, which relieved the "customary suit of solemn black." His forceps, technically known as a "pelican," were strong enough to wrench out a portion of the jaw if the tooth refused to part company by less forcible means.

To assure the crowd of the painless character of the operation was naturally the end and aim of the tooth-drawer's efforts. The tale of the poet Sibus (1661) shows us this poverty-stricken versifier, blessed or cursed with a magnificent set of molars, but without the wherewithal to use them. He lounges, hungry and destitute, before the booth of Cormier, the famous dentist, and the honest practitioner offers the poet the tempting sum of 10 sous for each of his teeth, on the strict understanding that he is to declare that the extraction has been rather pleasant than otherwise. The wretched man does his best, and swears—once it is over—that Cormier's methods are perfect, but his demeanor at the critical moment has not reassured the crowd, and payment is sternly refused. Arnaud, who operated on the Pont-Neuf—which, as every Parisian knows, is the oldest bridge in the French metropolis—proclaimed himself as dental practitioner to the Holy Roman Conclave; and portraits of his illustrious clients (the pope in the middle with a plaster on his face) figured in front of his booth. "Le Grand Thomas" was the most famous of all the seventeenth-century dentists. When the dauphin was born, he promised a free banquet to all and sundry on the Pont-Neuf; unfortunately, the veto of the lieutenant de police prevented this first experiment in free-luncheon counters. He died in 1757 comparatively poor—54,000 livres and some house property was considered a meager result for a successful "forain" of the Pont-Neuf.—*Chemist and Druggist.*

Hints, Queries, and Comments.

A RUBBER-DAM CLAMP.

Regardless of the excellence of the many rubber-dam clamps on the market, cases will arise which show their shortcomings. I had recently to consider a cavity high on the labial side of the cervix of an upper right canine. The most trusted clamps failed to hold; the crown had a cone-like shape, devoid of contour. A seamless copper shell was fitted to the tooth and trimmed at the gingival end to pass beyond the gum margin on the palatal side, as for a shell crown. Labially, the band was fitted higher, under the gum, to a point where it caused a slight blanching of the gum tissue. Next the incisal end of the band was trimmed to reach the incisal edge, palatally, and the palate portion was burnished closely against the tooth. The entire labial face was next cut out, care being taken to leave the cervico-labial portion of the band intact and slightly jutting down over the cavity. The free margin of this portion was then grasped with a pair of flat-nose pliers, and a flange was turned outward with a small riveting hammer. The tooth was dried, and the appliance, smootned and polished, was cemented in place, the dam was adjusted and was perfectly retained throughout the operation. This clamp gives better access and causes less discomfort to the patient than any other that I have used. These facts are due to its comparative simplicity and its extreme rigidity when set.

Fig. 1.

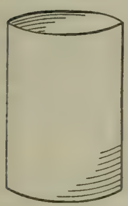


Fig. 2.

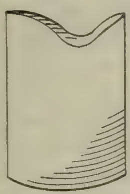


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

1, Seamless copper shell. 2, Band trimmed to gum line. 3, Face cut out and palatal side burnished. 4, Method of turning the flange. 5, Flange turned, ready to set. 6, Diagram of isolated tooth, with clamp holding rubber in place.

Paul Manning, D.M.D.

Lowell, Mass.

DENTAL CONCRETE.

I wish to record the results I obtained in experimenting with a novel filling material which I call "dental concrete." This concrete filling material consists simply in ***mixing one of the dental basic cements with the***

shavings or filings of a dental alloy. The admixture of the metal to the cement reinforces the latter very materially, adding to both the strength and the hardness of the filling. A number of such fillings have been inserted contemporaneously with several ordinary cement fillings, with the result that the concrete fillings have proved far more durable, and markedly less susceptible to the action of the oral fluids. Similarly, some concrete fillings were inserted together with amalgam fillings, and though no superiority is claimed for amalgam, yet it has given very satisfactory results. Upon polishing the fillings the metallic surface exposed is bright; it does not blacken as does an amalgam filling owing to mercury.

The manner of mixing the cement is as indicated, bringing the powder into the liquid and mixing to a creamy consistence; the metal is admixed until reaching the consistence enabling it to be rolled between the fingers. It is essential to the setting of the cement that the powder be carefully mixed into the liquid; but while this is a chemical union, the admixture of the metal is purely physical. Though there may be slight retardation in setting, because of the metal, the mixture results in a hard, resisting, concrete mass. The filling of deciduous teeth with "dental concrete," in place of cement used alone, will be found especially serviceable.

S. Grief.

Brooklyn, N. Y.

REPAIRING RUBBER INHALER OF NITROUS OXID APPARATUS.

The following is a description of a method which I have employed successfully in repairing the rubber inhaler of my nitrous oxid apparatus. The trouble with the inhaler was that its inflatable part deteriorated and permitted the air to escape, causing a poor adaptation of the mask to the face, with a consequent waste of gas, and poor anesthesia.

I was about to buy a new inhaler, when it occurred to me to paint the deteriorated portion of the rubber with a solution of unvulcanized rubber in chloroform. With this solution I coated it a sufficient number of times to insure a heavy layer of fresh rubber, and for esthetic reasons coated the entire mask with the same solution. After the chloroform had evaporated, the inhaler was dusted with talcum powder, at the same time rubbing the powder into the fresh rubber. This was done to do away with the gumminess of the unvulcanized rubber. I am very much gratified with the result.

The stability of this repair is evidenced by the fact that I inflated the inhaler about five or six weeks ago, at the time when the repair was made, and it has remained inflated since. Judging from its present appearance, there is no reason to believe that it will give way shortly.

Morris H. Golden, D.D.S.

Philadelphia, Pa.

Obituary.

DR. F. A. SHOTWELL.

Died, November 4, 1913, in Rogersville, Tenn., Dr. F. A. Shotwell, in his sixty-seventh year.

Dr. Shotwell was born in North Carolina. He was a gallant Confederate soldier, and during the civil war obtained wide reputation by his valor and loyalty to the cause he espoused. At the close of the war he took up the study of dentistry, and located in Rogersville, where he practiced until a short time before his demise, when failing health compelled him to retire. Dr. Shotwell was a member of the Tennessee State Board of Dental Examiners for twenty-two years, serving as secretary-treasurer of that body for seventeen years. He at one time was president of the National Association of Dental Examiners.

Deceased was an active Knight Templar, a deacon in the Presbyterian Church, and one of the most widely known dentists of the South. He leaves a wife, who was Miss Lucy Kyle, and two brothers.

"IN MEMORIAM" RESOLUTIONS.

Dr. Geo. S. Tigner.

The Atlanta (Ga.) Dental Society recently passed the following preamble and resolutions of regret on the death of their distinguished colleague (a brief sketch of whose career appeared in the Dental Cosmos for November, at page 1197):

Whereas, in the providence of an all-wise Creator, our fellow member, Dr. Geo. S. Tigner, died July 9, 1913; and

Whereas, his scholarly attainments, his ability as a teacher, his skill as a practitioner, and his keen interest in professional affairs, placed him in the foremost rank among the eminent men in Georgia; now, therefore, be it

Resolved, That we, the members of the Atlanta Dental Society, feeling deeply his loss, hereby express our appreciation of his worth and our sorrow over the untimely close of a successful career; and be it further

Resolved, That a page on our minute-book be set aside and the secretary be instructed to inscribe thereon these resolutions, and that a copy be sent to his widow and to the professional journals for publication.

Jos. D. Eby,
Claud N. Hughes,
J. K. Barrett, *Committee.*

Dr. Henry A. Smith.

At a meeting of the American Academy of Dental Science the following resolutions were passed on the death of Dr. Henry A. Smith, who became an associate fellow of the academy in 1892:

Resolved, That in the death of Dr. Smith, the dental world has lost one of its most prominent, valued, and respected members, and the academy an esteemed associate fellow, whose memory is forever engraved upon our records—a genial, whole-souled member; and be it

Resolved, That a page be reserved for these minutes to be spread upon its records, and a copy be transmitted to the family of Dr. Smith.

Murdoch C. Smith,
Waldo E. Boardman,
Harry E. Cutter,
Committee.

Dr. Thomas W. Clements.

At a meeting of the American Academy of Dental Science, the society ordered that a page of its records, "in memoriam," be set aside, and that on it be written the following:

In memory of our late fellow, Thomas W. Clements, D.D.S., D.M.D.

He was a faithful soldier of the Republic, a good citizen, a true friend. He exemplified to an extraordinary degree all those qualities which, in their sum, make the gentleman.

We mourn his loss, who brought to our profession the richest gifts of mind and heart.

As ethical practitioner, teacher, college trustee, member and officer in dental societies, he did much for the advancement of dentistry.

We sympathize with his many friends in their loss; we rejoice that it was our privilege to call him our friend, and we are glad that such a high character and delightful personality came into the profession of dentistry.

H. A. Baker,
F. S. Belyea,
A. R. Brown,
Committee.

Society Notes and Announcements.

PANAMA-PACIFIC DENTAL CONGRESS.

OPENS AUG. 30TH, 1915

A New Year's Announcement.

The Committee of Organization of the Panama-Pacific Dental Congress is pleased to greet the dental profession of the world with the announcement that now, twenty months before the date of opening August 30, 1915, the Panama-Pacific Dental Congress is so well advanced in the work of organization that the ultimate success of the congress is fully assured. Executive committees in almost every state and country in the world are giving publicity to the congress, securing memberships and soliciting contributions to its program.

The officers of the ten sections into which the program of the congress is divided have been selected, and the list includes many men of worldwide prominence and recognized ability, and under their supervision a program is being prepared which will outrank in scientific value and literary excellence the program of any previous congress.

Fifteen hundred front feet of space has already been reserved by manufacturers and dealers, who will present to the congress the greatest exhibition of dental wares and appliances and the most comprehensive manufacturers' clinics ever assembled, and the list of exhibitors is still far from complete, and is increasing in number every week. The Committee of Organization has distributed nearly 400,000 "stickers" bearing the seal of the congress and the date on which it will open, and these are becoming familiar to every user of dental supplies.

The entire congress, academic sessions, exhibits, and clinics, will be held under one roof, in ample accommodations, in the new auditorium now being erected in San Francisco's Civic Center, an auditorium which in size, architectural beauty, and peculiar fitness for the purposes it will serve, will rank with the best of similar buildings yet erected.

Letters received by the committee from every country in the world evince the widespread interest already manifested in the congress, and assure a large attendance. The Panama-Pacific International Exposition will attract the people of the world to San Francisco in 1915; the Panama-Pacific Dental Congress will bring together at the same time the best the dental world has of men, methods, and materials. To miss it will be to miss the opportunity of a lifetime to become familiar with modern dentistry in all its branches.

The Committee of Organization extends a hearty New Year's greeting of good wishes to the dental profession, and invites it to be present in San Francisco, August 30 to September 9, 1915.

Arthur M. Flood, *Sec'y*,
San Francisco, Cal.

NATIONAL DENTAL ASSOCIATION.

Date Advanced to July 7th.

At the urgent request of the Local Committee of Arrangements at Rochester, the Trustees of the National Dental Association have advanced the date of the next meeting one week; therefore the eighteenth annual session will be held in Rochester, N. Y., July 7, 8, 9, 10, instead of July 14, 15, 16, 17, 1914, as originally selected. The officers, the local committee, and all other committees are going to put forth every effort to make this meeting, which is the first under the

reorganization, the best in the history of the association, and we feel confident that the increased membership and interest in our association will prove a decided advantage in many ways.

HOMER C. BROWN, *President*,
Columbus, Ohio.
OTTO U. KING, *Gen. Sec'y*,
Huntington, Ind.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE National Association of Dental Faculties will meet in Buffalo, N. Y., at 10 A.M., on January 26, 1914. This is in accordance with the resolution adopted at the last annual meeting to meet in conjunction with the Institute of Dental Pedagogics. The Executive Committee will meet at 9 o'clock on the same morning.

B. HOLLY SMITH, *Chairman Ex. Com.*,
CHARLES C. ALLEN, *Sec'y*.

INSTITUTE OF DENTAL PEDAGOGICS.

THE next annual meeting of the Institute of Dental Pedagogics will be held in Buffalo, N. Y., January 27, 28, and 29, 1914. The Executive Committee is planning to present an exceptionally interesting program, which no dental teacher can afford to miss.

J. F. BIDDLE, *Sec'y*,
Pittsburgh, Pa.

CANADIAN DENTAL ASSOCIATION.

THE Canadian Dental Association meets for the first time in Winnipeg, Manitoba, May 26 to 29 inclusive, 1914, and a convention of unusual interest and profit is expected.

M. H. GARVIN, *Sec'y*,
Winnipeg, Man.

MARQUETTE DENTAL ALUMNI ASSOCIATION.

THE Marquette Dental Alumni Association will hold its eighth annual clinic, and dealers' and manufacturers' exhibit, at the auditorium in Milwaukee, on January 22 and 23, 1914.

E. A. FLANCHER, *Sec'y*,
Milwaukee, Wis.

FIRST DISTRICT (N. Y.) DENTAL SOCIETY.

THE third annual banquet of the First District Dental Society of the State of New York will be held at the Hotel Astor, Broadway and Forty-fourth st., New York City, on January 24, 1914, at 6 P.M., to celebrate its forty-ninth anniversary. All ethical practitioners are invited to attend.

DINNER COMMITTEE.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

THE regular meeting of the Academy of Stomatology will be held Tuesday, January 27, 1914, at the College of Physicians, Twenty-second above Chestnut st., Philadelphia, Pa., at 8 P.M.

Dr. A. W. Sweeney of Baltimore will read a paper entitled "Be Sure You Are Right, Then Go Ahead." Dr. Sweeney's paper will be a continuation of his discussion of last May, on the value of modern dental operations over those of the past.

NORMAN L. JAMESON, *Sec'y*.

VERMONT STATE DENTAL SOCIETY.

THE Vermont State Dental Society will hold its annual meeting in Rutland, Vt., May 21, 22, and 23, 1914.

P. M. WILLIAMS, *Sec'y*.

MINNEAPOLIS DISTRICT DENTAL SOCIETY.

THE Minneapolis District Dental Society will hold its annual meeting at the Masonic Temple, Minneapolis, Minn., January 16 and 17, 1914. From the data now at hand, this promises to be a gathering of many of the best men in the country. We have succeeded in obtaining the services of such prominent men on our program as Dr. W. H. DeFord of Des Moines, Dr. C. M. Work of Ottumwa, Dr. M. L. Ward of Ann Arbor, Dr. L. P. Haskell, Dr. Grace Rogers Spalding of Detroit, Dr. Adolph Gropper of Milwaukee, and Dr. D. M. Graham of Detroit.

We cannot help but feel that this meeting will afford a clinic really worth while, and accordingly extend a most cordial invitation.

A. A. ZIEROLD, *Sec'y*.

ILLINOIS STATE DENTAL SOCIETY.

THE fiftieth annual meeting of the Illinois State Dental Society will be held at the Hotel La Salle, Chicago, March 23, 24, 25, and 26, 1914. Chairman of Chicago Program Committee—Dr. Geo. N. West, 32 N. State st., Chicago. Chairman Exhibit Committee—Dr. P. B. D. Idler, 209 S. State st., Chicago.

HENRY L. WHIPPLE, *Sec'y*,
Quincy, Ill.

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirty-first annual meeting of the Minnesota State Dental Association will occur in Duluth, Minn., August 6, 7, and 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

BENJAMIN SANDY, *Sec'y*,
Minneapolis, Minn.

ARIZONA STATE DENTAL SOCIETY.

AT the fifth annual session of the Arizona State Dental Society, held in Phœnix, Ariz., November 5, 6, and 7, 1913, the following officers were elected: W. A. Baker, Tucson, president; J. L. O'Connell, Phœnix, vice-president; H. H. Wilson, Phœnix, secretary-treasurer.

H. H. WILSON, *Sec'y*,
Phœnix, Ariz.

NORTHEASTERN DENTAL ASSOCIATION.

ELECTION OF OFFICERS.

AT the annual meeting of the Northeastern Dental Association, held at Hartford, Conn., October 14 to 16, 1913, the following officers were elected: Edgar O. Kinsman, Cambridge, Mass., president; George A. Maxfield, Holyoke, Mass., first vice-president; Albert E. Carey, Hartford, Conn., second vice-president; Charles F. Kreppel, Forest Hill, Mass., secretary; J. Holmes Jackson, Burlington, Vt., assistant secretary; David Manson, Burlington, Vt., treasurer; Dana W. Fellows, Portland, Me., librarian; Edwin O. Blanchard, Randolph, Vt., editor.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE forty-sixth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 14, 15, and 16, 1914. The literary program will be rendered at the new State Educational building. The clinics will be given at the Hotel Ten Eyck and the dental exhibits in the hotel rooms, as was arranged for the 1913 meeting, which proved very satisfactory to the exhibitors.

An exceptionally attractive meeting is being arranged. A cordial invitation is extended to all ethical dentists in New York and sister states.

Exhibitors please address Dr. O. J. Gross, 404 Union street, Schenectady, N. Y., for space.

There will be the usual reduction of railroad rates on the certificate plan.

A preliminary notice will be issued during the month of March 1914, and the following month the completed program.

The Executive Council will meet at the Hotel Ten Eyck on Wednesday, May 13th, at 3 P.M.

For further information address

A. P. BURKHART, *Sec'y*,
52 Genesee st., Auburn, N. Y.

CONNECTICUT STATE DENTAL ASSOCIATION.

THE fiftieth anniversary meeting of the Connecticut State Dental Association will be held at Hartford, April 21, 22, and 23, 1914.

JAMES MCMANUS, *President*,
Hartford, Conn.,
ARTHUR V. PRENTIS, *Sec'y*,
New London, Conn.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

A REGULAR meeting of the Eastern Dental Society of the City of New York was held Thursday evening, November 6, 1913, at the Café Boulevard.

The paper of the evening, entitled "Notes on the Teeth and Dentists of Some French Monarchs," was read by Dr. John Bethune Stein. The essay was of great interest, and of an historical nature. A discussion followed.

A. LEWITTER, *Sec'y*.

MICHIGAN STATE DENTAL ASSOCIATION—

SOUTHERN MICHIGAN DIVISION.

The Southern Michigan division of the Michigan State Dental Association held their annual convention at Battle Creek on November 17, 18, and 19, 1913, with seventy-eight members present. Several interesting clinics were held.

The officers elected for the year 1914 are S. J. Lewis, Kalamazoo, president; B. R. Parrish, Battle Creek, vice-president; R. A. Bowie, Three Rivers, secretary and treasurer.

Geo. Bennett.

IDAHO BOARD OF EXAMINERS.

The Idaho State Board of Dental Examiners will meet in Boise, Monday, January 5, 1914, at 9 a.m., in the State Capitol building.

Albert A. Jessup, *Sec'y.*

SOUTH DAKOTA BOARD OF EXAMINERS.

The next regular semi-annual meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, January 13, 1914, at 1.30 p.m. Applications for examination should be made between the dates of January 1st and 10th.

Aris L. Revell, *Sec'y*, Lead, S. D.

NORTH DAKOTA BOARD OF EXAMINERS.

The next meeting of the North Dakota Board of Dental Examiners will be held at Grand Forks, N. D., January 13, 14, 15, and 16, 1914. All applications for examinations must be in the hands of the secretary by January 3, 1914.

For further information apply to

F. A. Bricker, *Sec'y*,
Fargo, N. D.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS.

The next examination of applicants for license to practice dentistry in the District of Columbia will be held at the George Washington University, January 5, 6, 7, and 8, 1914. Applications should be in the hands of the secretary two weeks before the date of the examination. Fee, $10.00.

Starr Parsons, M.D., D.D.S., *Sec'y*,
1309 L st., N.W., Washington, D. C.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending November 15, 1913:

First Lieut. R. T. Oliver reported for duty at Fort Worden, Wash.

James G. Morningstar, act d.s., is relieved from duty at the Letterman General Hospital, Presidio of San Francisco, Cal., and will take the transport to sail for Manila, P. I., about January 5.

First Lieut. Samuel H. Leslie is relieved from duty in the Philippine Islands about February 15th, and will take the transport to sail about that time for the United States, reporting to the Adjutant-general for assignment to duty.

First Lieut. Harold O. Scott is relieved from duty in the Philippine Islands about March 15th, and will take the transport to sail about that time for the United States, reporting to the Adjutant-general for assignment to duty.

Herman S. Rush, act.d.s., is relieved from duty at Fort D. A. Russell, Wyoming, and will take the transport to sail for Manila, P. I., about January 5th.

For the week ending November 22d:

Edwin M. Kennedy, act.d.s., is relieved from duty at Fort Robinson, Nebr., and will proceed at the proper time to San Francisco, Cal., and take the steamer to sail from that place on or about January 5th, for Honolulu, H. T.

Walter L. Reesman, act.d.s., is relieved from duty with the Second division, and will proceed to San Francisco, Cal., at the proper time to take the transport to sail from that place on or about January 5th, for Honolulu, H. T.

The following acting dental surgeons have been assigned to duty as follows: Samuel J. Randall, Fort Robinson, Nebr.; Charles Tainter, Fort Barrancas, Fla.; Don G. Moore, Fort Totten, N. Y.; Oscar G. Skelton, Fort Huachuca, Ariz.; Harlan L. Thompson, Fort Sill, Okla.; Robert B. Tobias, Texas City, Texas.

For the week ending November 29th:

H. C. Peavey, ACT.D.S., November 25th joined Fort Williams, Me.

J. G. Morningstar, ACT.D.S., granted leave of absence for one month.

Emmett P. Varvel, ACT.D.S., will proceed to the Presidio of Monterey, Cal., for duty.

Ura M. Bryant, ACT.D.S., will proceed to Fort Sam Houston, Texas, for duty.

The following assignments of ACT.D.S. recently appointed, are ordered: J. Craig King, Fort Myer, Va.; William S. Rice, Texas City, Texas; Harry C. Peavey, Fort Williams, Me.

For the week ending December 6th:

D. G. Moore, ACT.D.S., joined his station at Fort Totten, N. Y., December 2d.

J. C. King, ACT.D.S., joined his station at Fort Myer, Va., November 28th.

H. C. Peavey, ACT.D.S., joined his station at Fort Williams, Me., November 30th.

C. Taintor, ACT.D.S., joined his station at Fort Barrancas, Fla., December 2d.

For the week ending December 13th:

S. J. Randall, ACT.D.S., December 3d, arrived at Fort Robinson, for duty.

W. S. Rice, ACT.D.S., December 2d, joined Texas City.

H. S. Thompson, ACT.D.S., December 4th, joined Fort Sill.

U. M. Bryant, ACT.D.S., December 4th, arrived at Fort Sam Houston for duty.

R. B. Tobias, ACT.D.S., December 6th, arrived at Texas City from Dayton, Ohio, for duty.

Warren G. Torrence, ACT.D.S., recently appointed, will proceed to Texas City, Texas, for duty with Second division.

INTERNATIONAL DENTAL CONGRESS, 1914.

Special Steamer Arrangements.

It has been thought advisable to arrange so that those who wish to attend the International Dental Congress, in London, next summer, may go on the same steamer, if they wish.

The plan is to arrange to sail on a steamer leaving New York immediately after the closing of the National Dental meeting, which will be held in Rochester, N. Y., from July 7th to 10th.

Those who wish to join the party sailing at that time will please notify me, at 560 Fifth ave., New York City, at as early a date as possible, in order that the steamship company may know how many to provide for.

Herbert L. Wheeler,
Transportation Committee, N. D. A.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER 1913.

November 4.

No. 1,077,572, to John W. Welch. Dental engine stone and mandrel.

No. 1,077,703, to Jacob W. Greene. Mold for making dental plate.

No. 1,077,909, to Edward C. Gruehl. Toothbrush.

November 11.

No. 1,078,230, to Samuel L. Whitright. Dental cotton-holder.

November 18.

No. 1,078,829, to Delos H. Carpenter. Die for forming dental backings.

No. 1,078,844, to Everett B. Fewell. Artificial tooth.

No. 1,079,128, to Clarence O. S. Howe. Surgical instrument.

November 25.

No. 1,079,414, to Irwin G. Jirka. Clamp mouth-mirror.

No. 1,079,540, to G. W. Clapp and E. S. Ulsaver. Device for use in connection with the articulation of artificial teeth.

No. 1,079,618, to John H. Frayne. Toothbrush holder.

THE

DENTAL COSMOS.

VOL. LVI. FEBRUARY 1914. No. 2.

ORIGINAL COMMUNICATIONS.

THE PATHOLOGIC AND THERAPEUTIC POSSIBILITIES OF UPPER MAXILLARY CONTRACTION AND EXPANSION

AS EVIDENCED BY

Experiments upon Guinea-pigs, Rabbits, and Dogs, in Confirmation of Clinical Observations in Human Cases.

By GEO. V. I. BROWN, D.D.S., M.D., Milwaukee, Wis.

(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 8, 1913.)

THE trend of modern progress in the study of disease is unquestionably toward recognition of underlying chemico-vital principles which may be held accountable for trophic changes and other influences pertaining to a general as well as local developmental progress and the nervous disorders to which these as well as other physiologic and pathologic conditions may be subject. The dissociated consideration of clinical and pathologic manifestations has undoubtedly led to the designation of many affections under distinct terms which, it is not at all impossible, may in the near future be understood to be expressions of the same underlying etiologic factors, and therefore in a primary sense more or less identical in character.

PURPOSE OF THE CLINICAL ILLUSTRATIONS.

The illustrations of clinical and experimental results that are presented for your consideration today cover a wide range of affections. They are designed to emphasize the possibility of a very much more extended association between defective nasal and maxillary development, with their consequent pathologic states and influences, and general development, trophic changes, nervous disorders, as well as other more or less remote affections, than is commonly recognized in this relation. Certain features of the etiologic, pathologic, and structural considerations which bear upon the influence of these oro-nasal

factors in disease are well understood. Other causal factors, though recognized as important to pathologic manifestations in other regions, are not generally accepted as being of nasal and maxillary origin. A third division must, for the present at least, depend to some extent upon the more or less theoretic application of certain developmental features connection with which, in the absence of definite knowledge, can only be established by comparative consideration of certain vital phenomena which, viewed in the light of experimental results, clinical manifestations, and the more or less arbitrary application of better understood laws governing bodily growth and metabolism, appear to share at least a measure of interdependence.

DUCTLESS GLAND SERIES.

The close connection of the ductless gland series—which includes the hypophysis and the thymus and thyroid glands—with bodily growth and its antithesis, arrest of development, and also with nervous states and organic function, has forced recognition through an abundance of clinical evidence which is now being more and more corroborated, and at the same time systematized, in the course of scientific research, and particularly animal experimentation. The most valuable record of achievements in this direction has recently been presented by Dr. Harvey Cushing in his work, "The Pituitary Body and Its Disorders." He records certain syndromes as appearing when the anterior lobe of the hypophysis in dogs was severed or disjoined, and certain other quite distinctive syndromes as resulting from similar treatment of the posterior portion of this body.

CUSHING'S CLASSIFICATION—PITUITARY DISORDERS.

Following the classification previously adopted in the case of the thyroid gland, Cushing has applied the terms hyperpituitarism as indicating a state of overactivity, and hypopituitarism as describing states of under-activity of the pituitary, and since these two terms were found to be clinically misleading because of conditions which presented a blending of the symptoms of each of these forms of functional disorder, the term dyspituitarism became necessary to describe the states due to perverted function of the hypophysis.

He also suggests the following subdivisions for each of the five clinical groups under which he has classified the states of dyspituitarism: "(1) The cases in which the clinical manifestations of past or of existing hyperpituitarism predominate (more particularly overgrowth, resulting in gigantism when the process antedates ossification of the epiphyses, and in acromegaly when it is of later occurrence). (2) Those in which the clinical manifestations of hypopituitarism predominate (adiposity, with a persistence of both skeletal and sexual infantilism when the process originates in childhood, or adiposity with sexual infantilism of the reversive form when it originates in the adult). (3) The mixed or transition cases, exhibiting some features of both states—in other words, with evident dyspituitarism."

He further states that there may be combinations of inactivity of the posterior lobe with overactivity of the anterior lobe; a combination of overactivity of the posterior lobe with anterior lobe deficiency; and finally, a combination showing either overactivity of both lobes or deficiency of both lobes. All these possible states may occur either before or after adolescence, and lead to very different clinical pictures.

ANDERSON'S EXPERIMENTS.

Without attempting detailed description of the present scientific status of this question, it appears to be sufficient for us to call to mind briefly the potent possibilities of influences from this region, while we contemplate in this light certain well-known and commonly accepted facts pertaining to bodily disorders, and apply these as directly as possible in accounting for oral defects. The results reported by the late Dr. Anderson of Detroit, who closed the nasal openings

of guinea-pigs, rabbits, and dogs with cotton by suturing the external nares, were much the same as those shown by the puppies in which I caused partial nasal stenosis to occur in a quite natural way by preventing growth across the maxilla in the region of the palate, as shown by the illustrations.

All these animals developed certain symptoms which were not unlike those commonly found among children whose contracted upper dental arches and high narrow palatal vaults are familiar to all.

Anderson's summary of the results of his experiments is as follows:

(1) Nasal obstruction leads to death or to serious impairment of vitality.

(2) The lowered resistance predisposes to infections (particularly bronchopneumonia, sero-purulent pleurisy, and similar affections).

(3) Local disease of the respiratory tract is induced.

(4) Obstruction of the nostrils leads to dilatation of the heart.

(5) Changes in the skin and the blood of the dogs occur.

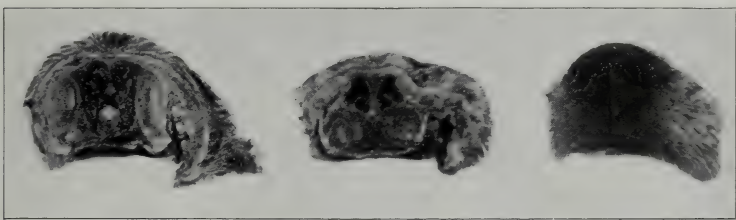
(6) Symptoms resembling asthma and emphysema may be induced in the lower animals.

(7) Emphysema of the lungs can be demonstrated histologically.

(8) Reopening of the occluded nostrils is followed by prompt disappearance of the symptoms.

FIG. 1.

A B



C D E

Sections of head of puppy six months old, with jaws arrested in development across the palate by wiring at eight weeks old. These sections when compared with those of a normal pup shown in Fig. 2 show plainly the contracted effect upon the nares, the deviation of the nasal septum—especially the section shown in C, the point at which the wire was inserted and development arrested. The enlarged maxillary sinuses are also evident in comparison.

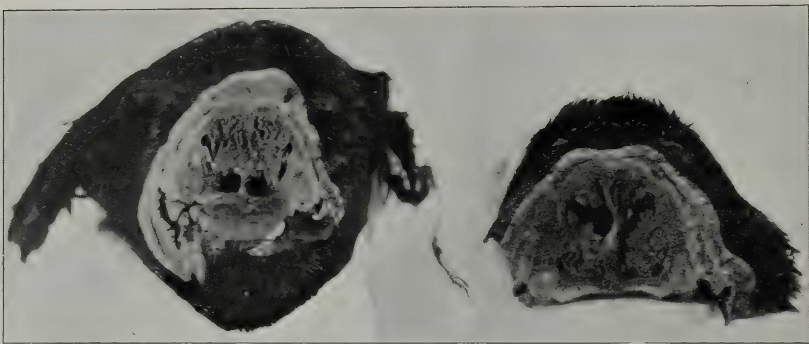
DESCRIPTION OF MY EXPERIMENTS UPON DOGS, AND THE RESULTS.

Through the courtesy of the Parke-Davis Company, in whose biological and research department I have been per-

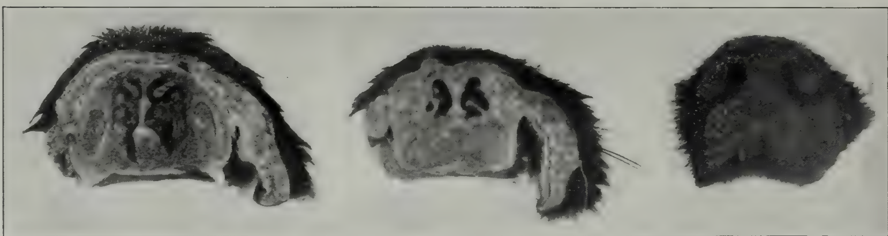
mitted to do original research work on puppies, and with the able assistance of Dr. Ferry and his associates in the laboratory, a series of experiments has been carried on during the past two years. The first of these I have previously reported as follows:

Several pups eight weeks old were operated upon by passing wires through the maxilla from a point above the roots of the teeth upon one side above the palate and out at a corresponding point upon the opposite side. The palate was compressed sufficiently to force the upper teeth inside or in lingual occlusion with the lowers, so that the upper and lower jaws of these puppies were placed in about the same occlusal relation that exists with growing children whose bicuspid teeth meet the corresponding lower teeth in lingual (inside) instead of buccal (outside), or normal, occlusion. Not nearly so much force in compression was used as would be necessary to close a palate fissure according to the method which was formerly widely practiced upon infants with cleft palate. The purpose was to reproduce as nearly as possible the maxillary conditions of typical cases of mouth-breathing children. One pup was kept without operation as a control, and all were allowed to develop until they reached the age of six months, which it was estimated would approximately correspond to the age of a child of eight or nine years old. The puppies were then killed, the heads frozen, and sections cut through the nose and upper jaws at short intervals. The result is shown in Fig. 1, A, B, C, D, E, and Fig. 2, A, B, C, D, E. Marked difference between the nares will be noted throughout both series, but the section marked C in each is exactly at the point where compression was made, the almost complete stenosis in Fig. 1 contrasting quite strongly with the same section in Fig. 2.

Fig. 2.



A B



C D E

Control pup, same age as Fig. 1, upon which no operation was performed.

SYMPTOMS SHOWN BY PUPS SIMILAR TO THOSE OF HUMAN PATIENTS.

These pups developed the following symptoms, which are identical with those commonly found in children with high, contracted palates and irregular upper

dental arches, viz, a high degree of susceptibility to infection, which was evidenced by congested bronchi and lungs, and was in marked contrast to the usually notable resistance to pathogenic bacteria of the bronchial mucous membrane in healthy dogs, and quite in accord with frequent colds, bronchitis, and tendency to pneumonic affections that are characteristic of all mouth-breathing children.

Extreme nervousness was also similar to children's of this type. The nasal accessory sinuses became enlarged. This is particularly evident in the maxillary sinuses as shown in Fig. 1, A. The experiment pups became emaciated and were not nearly so large and fat as the control pup, although given the same food. Making all due allowance for impure breed, there was still evident a considerable interference with trophic changes.

In view of the fact that children appear to lose these tendencies when relief is given by direct maxillary expansion, and since mechanical compression in the maxillary region alone was accountable for them in the dogs, there is at least a warrantable reason for the belief that, although these experiments are incomplete and still in progress, they already point in the direction of some great underlying principle which if understood would be far-reaching in its effect upon nervous and other diseases of general as well as local character. It is well known that the regions of the face, nose, mouth, and jaws give frequent evidence of the so-called stigmata of degeneracy. Neurotic tendency is commonly associated with contracted palates. irregular dental arches, and nasal defects.

THE INDICATIONS OF A DISTINCTIVE GOVERNING DEVELOPMENTAL INFLUENCE.

It seems to be of more than passing importance to note that among the early evidences of acromegaly the notable features are prognathism of the jaw, enlargement in the region of the shoulders, and of the extremities; that certain infections are also particularly evidenced in the extremities, as in the spade-shaped finger-tips of tuberculosis, and more or less similar effects from pneumonia; alterations in form which appear in the course of rheumatic affections; the characteristic enlargement of the face and neck in angeio-neurotic edema, or the wasting of facial hemiatrophy—and so

Fig. 3.

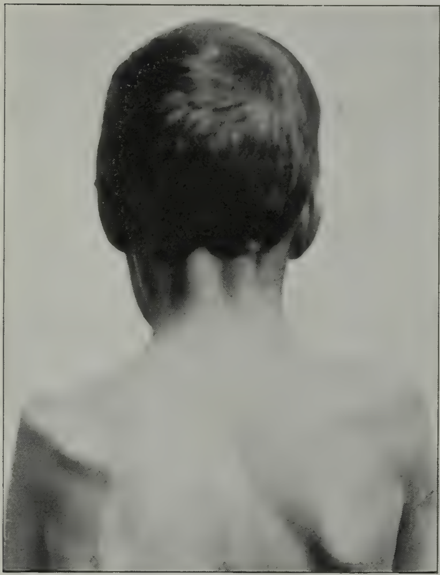
Face of boy nine years old. Typical case of mouth-breathing, contracted dental arches, etc.

on through a large number of affections that might be cited if necessary, to prove that certain local as well as general atrophic and hypertrophic conditions occur not only during the pre-adolescent period of development, but at all periods of life—conditions such as can only be satisfactorily accounted for by the recognition of some distinctive governing influence the stimulation or impairment of which must be held to account as causative.

Among patients referred to me by

rhinologists for maxillary expansion to correct pathological states coincident with contracted nares and deflected nasal septa who had also high, narrow palatal vaults, irregular dental arches, adenoids, enlarged tonsils, and typical mouth-breathing, I have found upon more general examination that in a large number

FIG. 4.



Characteristically uneven shoulderblades of same boy as in Fig. 3.

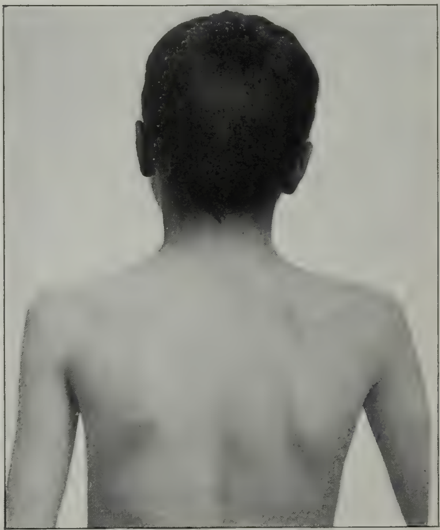
FIG. 5.

Enlarged thumbs and palmar wasting in hands of boy shown in Fig. 3.

FIG. 6.

Feet of boy shown in Fig. 3.

FIG. 7.



Characteristically uneven shoulderblades.

of cases their backs were also irregularly formed, one shoulderblade being larger than the other, and one of them higher or lower with a tendency to curvature of the spinal column. (Figs. 4–7.) The hands and feet also quite frequently showed irregularities. In the hand, palmar wasting and an enlarged thumb were sometimes conspicuously evident. (Figs. 5 and 6.) One side of the face was sometimes found to be more developed than the other, the unilateral asymmetry being quite outside of that which might be expected from irregular teeth alone. These features bore a striking resemblance to the recognized indications of muscular dystrophy, which in its progressive form leads to weakness and actual loss of usefulness in muscles of the affected regions, and which may end in death, or in some mysterious way become arrested, leaving the muscles in a state of partial usefulness. In the comparatively crude state of present knowledge with regard to these conditions, these cases have been classified in a limited way, and named after their first observers, as follows:

FORMS OF MUSCULAR DYSTROPHY.

The Duchenne type—pseudo-hypertrophy and apparent disproportionate increase in the size of the muscles, usually beginning with the calves of the legs, which is really an increase of fat cells with atrophy of muscular fibers.

The Erb type of juvenile dystrophy, usually beginning between the ages of twelve and sixteen, affecting primarily the muscles of the shoulder, which become hypertrophied but weakened, and by gradual progress affecting the muscles of the body.

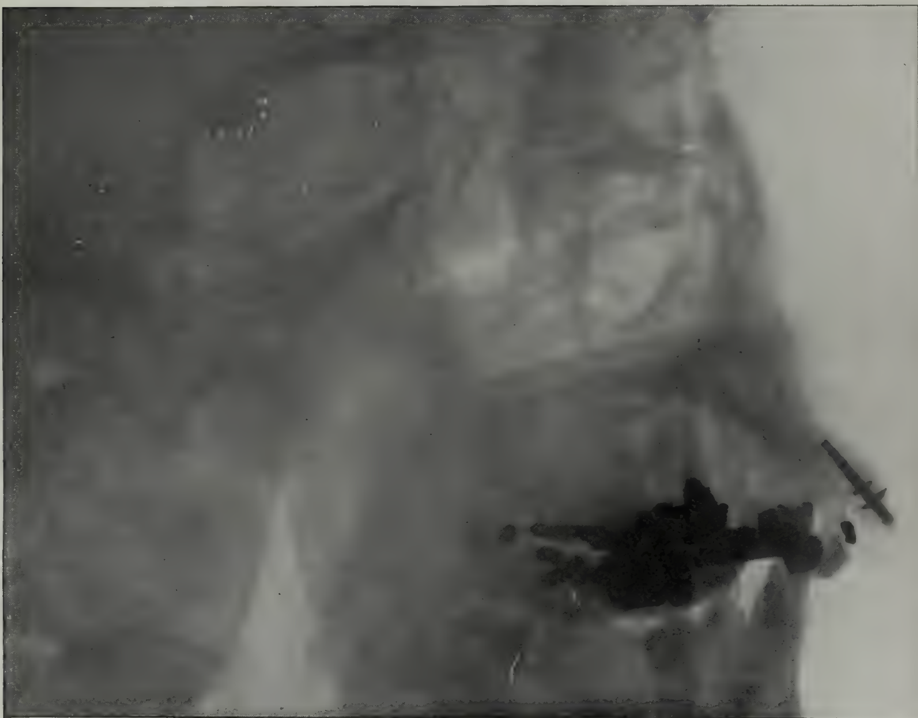
Landouzy-Déjérine dystrophy is also usually developed in early childhood, but occasionally appears in adults. Its principal feature is muscular atrophy of the face, which begins with the orbicularis oris, extends to the risorii, to the levator menti, and to the other muscles of the face associated with the mouth. In consequence, the lips cannot be firmly closed, the mouth is habitually open with the lips projecting, the so-called "tapir mouth;" quite naturally there is more or less difficulty in speech, in control of saliva, in drinking, and in other acts which depend upon the lips. There are no fibrillary twitchings, no disturbance of sensibility, and there is gradual decrease of mechanical muscular excitability.

Certainly it is more than a coincidence that the parts chiefly affected by the several forms of muscular dystrophy are so nearly identical with those that we find are not uncommonly irregular among patients whose chiefly noticeable defects are in the region of the nose and mouth. The patients shown in the illustrations not only showed an improvement in general health when their palatal arches were expanded by direct pressure which caused a separation of the upper maxillæ at the median palatine suture, giving increased space for nasal breathing and a consequent healthfulness of intranasal tissues, but also freedom from disadvantageous nervous states. There was, moreover, an apparently complete arrest of irregular development in other regions of the body. It would be assuming too much in the light of our present limited knowledge of such conditions to say positively that these were real cases of muscular dystrophy, which would otherwise have produced complete helplessness or death, and that maxillary separation alone was responsible for the correction of the defective developmental tendency; but there can be no doubt about the fact that these individuals did not become worse, and that they did improve in general as well as local development. In one case the cousin of one of these patients already bears a shriveled leg upon one side which cannot reach the ground and is incapable of serving any really useful purpose, and the members of the family at least believe that his symptoms began in much the same way as those of the little fellow for whom I performed maxillary expansion, and who is now sturdy, evenly growing, well developed, and in all respects a progressive youth.

THE INFLUENTIAL FACTORS IN MAXILLARY EXPANSION.

The observation and treatment of large numbers of cases of this class has made it possible to outline certain conditions and results that may be so fully demonstrated as to warrant their definite acceptance. Other conclusions, as already indicated, must for the time being only be considered as important possibilities, and yet the known facts point the way so plainly along this line of scientific reasoning, and the wonderful benefits that seem to lie just before the orthodontists and dentists in this promised increase of their usefulness are so great that their due consideration is imperative. We do know that following maxillary separation by rapid expansion in individuals presenting the clinical picture I have described, there is manifested in addition to the relief of freer nasal respiration and better nasal accessory sinus drainage, an influence upon nerve tension that tends to bring about a general improvement in nervous conditions. This is many times an active factor in helping to overcome a tendency to habits such as wink-

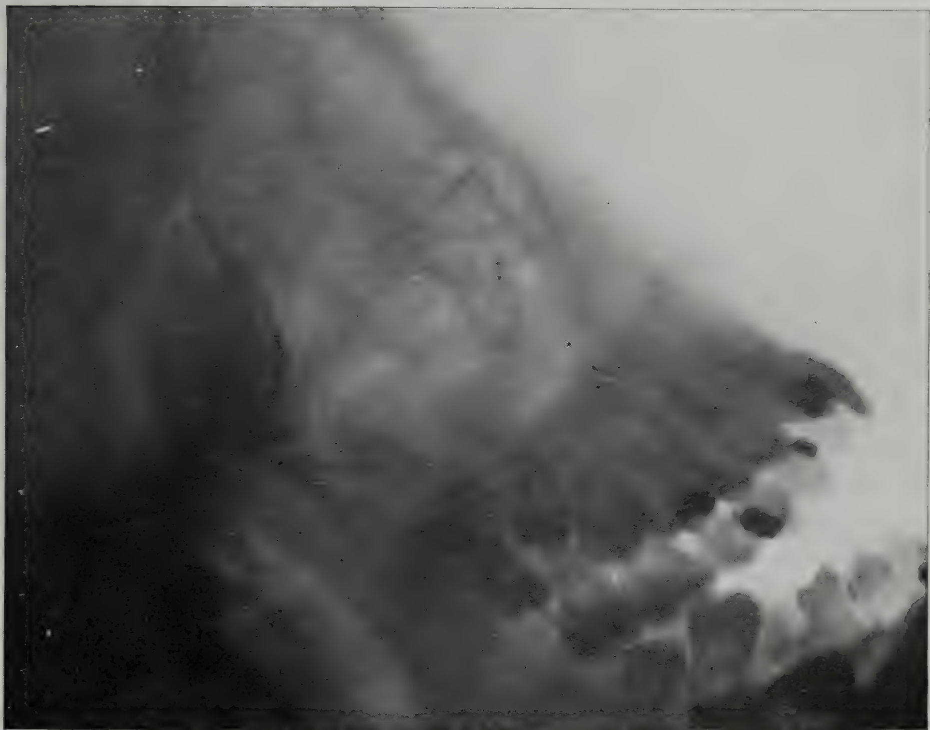
FIG. 8.



Skiagram of the head of one of these patients, showing the enormous size of the frontal sinus and the peculiarly restricted sella turcica, which is outlined with white dots. In this case there were not only peculiarities of growth of shoulderblades and other parts, but a correspondingly limited mentality. Just how much benefit maxillary expansion may ultimately accomplish for this patient of twenty-five years it is too early to attempt to decide, but a measure of relief has been given to his almost constant headaches, and other symptoms of frontal sinus disease seem to have abated or entirely disappeared. General trophic as well as nervous conditions seem to be improved.

ing of the eyelids or similar involuntary acts that simulate the beginning of spasmodic affections. An almost innumerable list of other evidences of unstable nervous tendencies could be described if necessary. Notable examples of these are referred to in connection with the illustrations. The dulness and apathy which are not only pathognomonic of mouth-breathers, but of serious nervous states as well, seem to disappear. These patients do better in their school or college work after this treatment than before. Increased growth or weight indicates that the centers governing trophic changes have been stimulated. How much of all this progressive effect the improved respiration, unaided by any other factor, may be responsible for, it is difficult to say, but it is reasonable to assume that the vital and final influence lies much deeper. In a prophylactic sense there is almost unlimited opportunity for expansion in the region of the jaws and face to give greater developmental freedom at the base of the skull in young children, thereby favoring more perfect conditions pertaining to the large foramina, through which the cranial nerves and accompanying vessels must emerge, and compression of which under disturbed conditions might be favored by imperfect development.

Fig. 9.

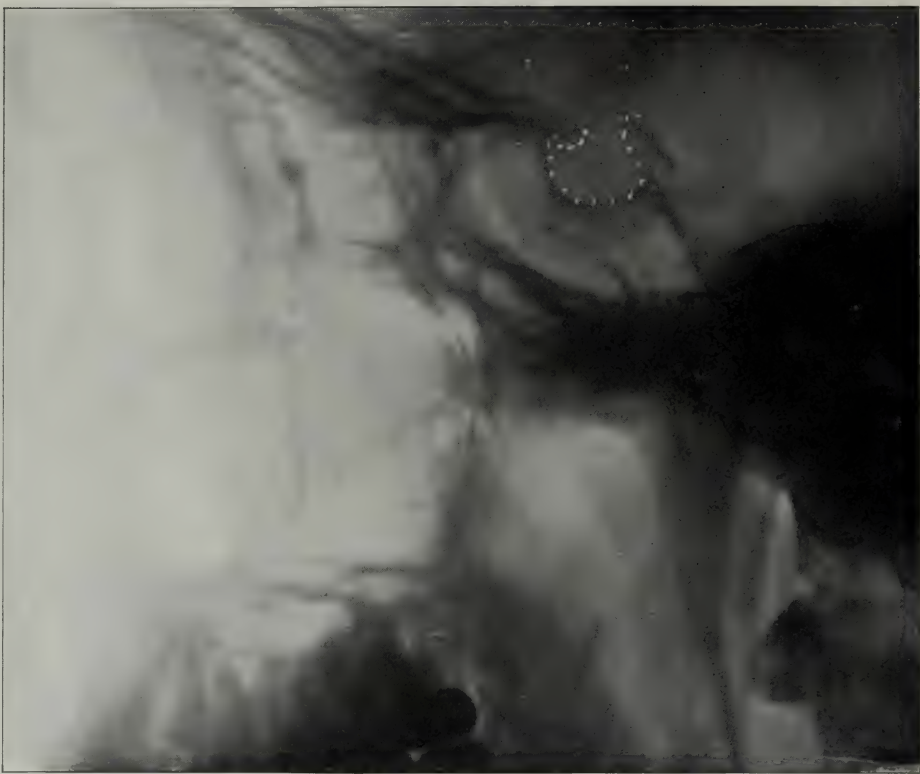


Skiagram of the head of a boy with markedly deficient mentality. The use of numbers seems to be beyond his control. The irresponsible, more or less uncontrollable disposition which is peculiar to cases of this kind has made it difficult to determine results accurately, but there seems to have been a definite measure of benefit from spreading his upper arch that it was admitted no other agency could accomplish.

If the direct mechanical influence of

the treatment does not materially affect the form of the sella turcica, a possibility that must be considered, then it is quite probable that the hypophysis may retain, even in advanced age, a susceptibility which tends toward a return to the closer association with respiratory conditions that it appears to have in early life, and thus be stimulated to unusual or at least restored activity by the change in the respiratory apparatus which has been accomplished; or the result may be attributed to some extent to the pharyngeal hypophysis—a small epithelial body situated in the pharyngeal mucosa, and which according to Cushing has been recognized by Erdheim and Cavallieri and was systematically studied by Haberfeld, who found this small glandular strand, varying from 1 to 7 mm. in length, situated in the mucous membrane just behind the alæ of the vomer, with regularity in a systematic study of fifty-one human subjects, and designated it the "hypophysis pharyngea." If it can be demon-

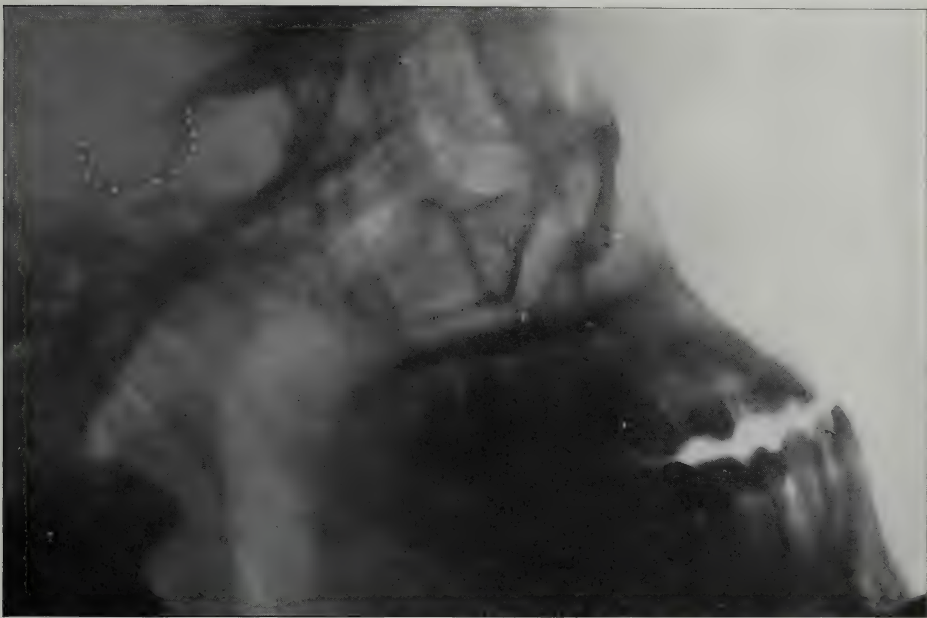
Fig. 10.



Skiagram of the head of a man thirty years old. Shows the same large frontal sinus as Figs. 8 and 9, and a large sella turcica, the individual himself being a man of large size. In his case a grave and almost hopeless general nervous condition was apparently overcome and a complete cure effected, with no other treatment than separation of his upper maxillæ and the incidental freer drainage of the nasal accessory sinuses, with consequently improved respiratory conditions, and regular outdoor exercise. No one of the individuals who watched this case throughout the course of treatment has the slightest doubt of the directly beneficial influence of spreading the upper maxillæ.

strated that the pharyngeal hypophysis shares or can be made to substitute for the pituitary activities under either normal or abnormal conditions, then much which is now clinically demonstrable in cases of maxillary contraction and their subsequent expansion might be readily accounted for, because the parts adjacent to the alæ of the vomer would be the very first that one might expect to be affected by maxillary expansion effected through separation of the median palatine suture. The promptness with which trophic changes and the relief of nervous conditions sometimes occurs in the course of this treatment of these patients would then be more satisfactorily accounted for than by any result which might occur subsequent to changes in bone development, even if these could be demonstrated to ultimately alter the form of the sella turcica as previously suggested.

Fig. 11.



Skiagram of the head of a young man twenty years old which shows an enlarged frontal sinus and a very large sella turcica. In this case there was evidence of a tendency to acromegaly noticeable in the very much enlarged lower jaw, which was prognathous, with the lower teeth extending three-eighths of an inch beyond the upper. He had also the characteristic broad fleshy nose and thick lips, chubby hands, and square-shaped finger-tips described by Cushing in cases of hypopituitarism. Extreme sensitiveness of his eyes threatened loss of vision, although examinations by oculists revealed no local condition to account for this affection. These, together with excessive nervousness, had obliged him to give up school. Almost immediately following spreading of the upper arch and wide separation of the central incisors, which indicated maxillary separation, his nervousness and the eye condition began to improve. In a short time he was able to continue and has since finished his college course. He is now in business and apparently unaffected by his previous trouble.

CLINICAL EXAMPLES.

The examples shown in Figs. 8–21 appear to be dental and facial irregu-

larities of development of a not uncommon type, while yet further study of their histories and symptoms reveals the fact that they are closely akin to recognized forms of muscular dystrophy. The results of treatment are apparent in both general and local improvement.

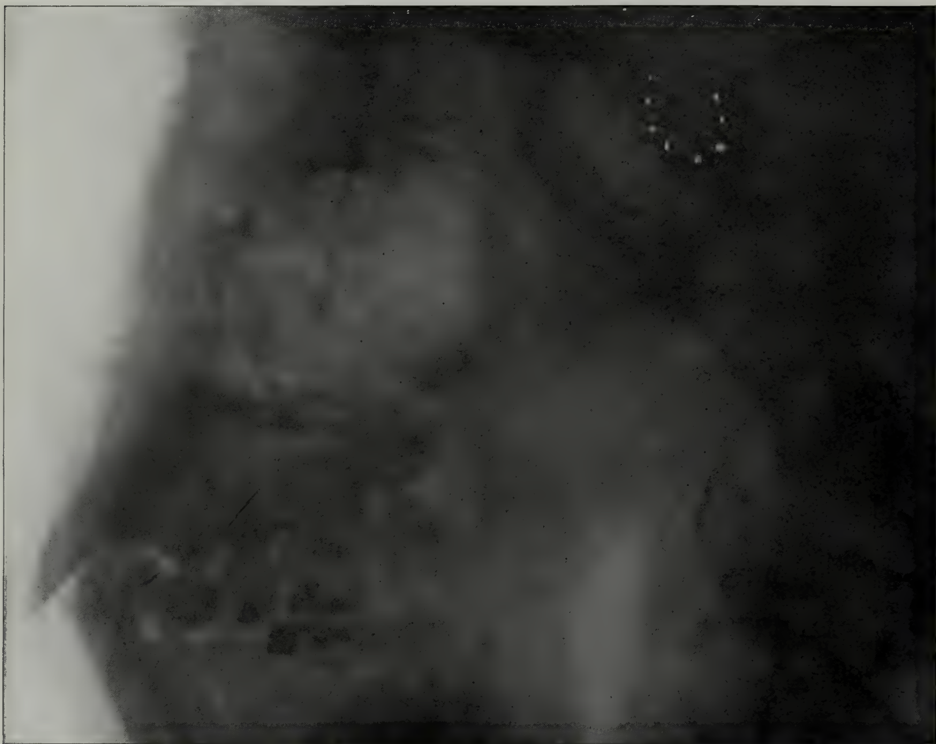
The following case is typical of many others that might be illustrated and described:

Case I. A girl, age sixteen.

History: Three operations had been previously performed for the removal of nasopharyngeal adenoids, with aparent recurrence after each operation. On account of general ill health, nervousness, and frequent colds, attended by evidence of both local and general arrest of development, the patient had for some time been unable to attend school continuously, and suffered frequent illness.

Symptoms and general appearance: Height 5 feet 2 inches; weight 92½ pounds. More or less other indications of insufficient development. Marked inequality of development in the region of the shoulderblades, closely approximating if not identical with the Erb type of juvenile dystrophy. This was so evident, her mother said, that dressmakers had considerable difficulty in fitting her dresses. Marked nasal obstruction, arrested development of the lower part of the face, receding chin, and contracted upper and lower dental arches. Two upper bicuspids—one on each side—had been removed by some dentist, with the mistaken idea of correcting dental irregularity. When she was about nine years

Fig. 12.



Skiagram showing the opposite type of development. Instead of being short and broad as was the case with the patient represented in Fig. 11, this girl of eleven years was tall, thin, ill-nourished, and so nervous as to be almost a chronic invalid. Marked improvement followed separation of the upper maxillæ and the establishment of freer nasal respiration.

old the spaces thus caused were almost completely closed by contraction of the upper dental arch. One lower bicuspid on the right side had been extracted about the same time with the same effect.

Treatment: The upper maxilla was readjusted by maxillary expansion, and the lower arch made to correspond. Both arches were increased in an antero-posterior direction sufficiently to regain as far as possible the space lost through extraction of the teeth, after which a dentist, Dr. P. B. Wright of Milwaukee, inserted bridge work to retain the full size of the jaws thus secured.

Result: Increase in health and weight. Relief from excessive nervousness. Improvement in back and shoulders. She finished her high-school course and is now successfully employed in hospital work.

REASONS FOR BELIEF IN MEDIAN MAXILLARY SUTURE SEPARATION.

After approximately fifteen years' continuous experience in widening dental arches by rapid expansion for the purpose of enlarging the nares through separation of the median palatine suture, or, as I have previously called it, "readjustment of the maxillary bones," with almost invariably satisfactory results in giving at least a measure of intranasal relief, it is with surprise that I note a more or less marked tendency among orthodontists to question the practicability of this simple process; the more so because the idea is not new. Undoubt-

FIG. 13.

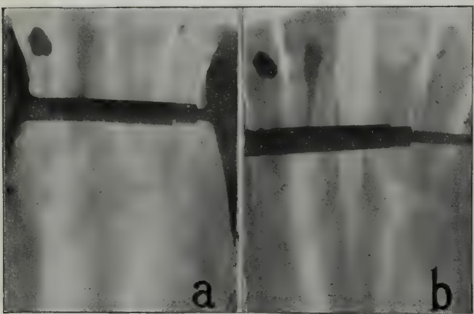
Skiagram of the head of a young man seventeen years old. (The headaches and other symptoms in this case were markedly improved as soon as the separation of the maxillæ was accomplished as shown in Fig. 14.)

edly most of those who regulated teeth according to older and perhaps somewhat cruder methods have occasionally been more or less alarmed by the unexpected parting of the central incisors through separation of the maxillary bones. Usually references that have been made to this condition formerly were along the line of caution against its occurrence.

Dr. Clark L. Goddard, in Kirk's "American Text-book of Operative Dentistry" (2d edit., 1900, page 698), makes the following reference:

Separation of the superior maxillæ at the symphysis. When strong pressure is applied upon molars and bicuspids to spread the arch the superior maxillæ may be separated at the symphysis. Such separation was first recorded by Dr. E. C. Angell of San Francisco in 1885, and has been noticed by Guilford, Black, Talbot, Farrar, Ottolengui, and others since.

FIG. 14.



A B

Skiagram of the palate of the same young man as shown in Fig. 13. A, Showing the appliance in place, but before pressure has been applied. B, Showing separation of the median palatine suture.

Bogue and other operators with whom I have discussed the subject described having had similar experiences. Dr. F. M. Willis, of Utica, N. Y., in the DENTAL COSMOS (July 1911, pp. 784–86) gives a very clear description of some cases in which successful results were obtained through separation of the maxillary bones for patients of Dr. J. S. Kirkendall of Utica, and Dr. Varney of Cleveland, Ohio, has also contributed much evidence in this direction.

In my own early practice I have sometimes been quite seriously alarmed by having caused it inadvertently. The first case in which I performed this operation for the specific purpose of immediately increasing the width of the nares in a case of almost total deafness, in order that Dr. Nelson M. Black of Milwaukee might be able to catheterize the Eustachian tubes to relieve the oral conditions, has been widely reported, as have many cases since treated in associa-

FIG. 15.

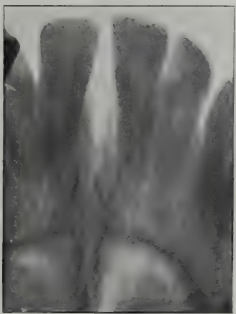
Another skiagram of the same case as Figs. 13 and 14, showing that in addition to the usual indications of separation of the median palatine suture there was a slight separation between the nasal bones and nasal process of the superior maxillary.

tion with rhinologists in widely different parts of this country. In fact, so many such results have been published or otherwise recently reported that only a passing notice is practicable at this time.

In support of my own belief I offer the following summarized evidence in proof that it is at least well founded:

(1) Large numbers of cases in which within a period of approximately seven days to two weeks the central incisors have moved apart without the direct application of any force whatever to these

FIG. 16.

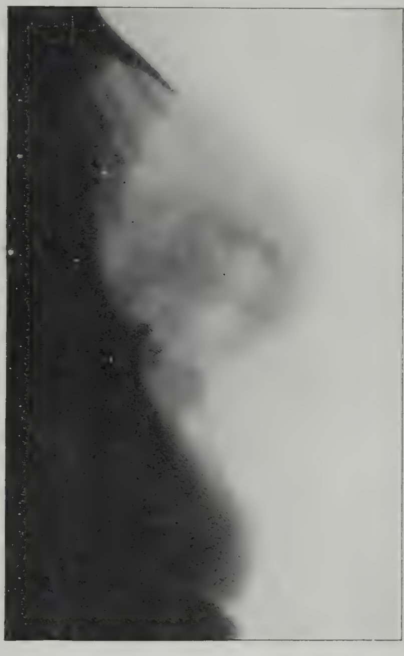


Skiagram of the palate after the maxillæ were separated in the mouth of a boy thirteen years old.

teeth, and in which according to the reports after examination by rhinologists there was corresponding improvement in the intranasal conditions, with evidence of increase in the size of the nasal chambers. Among these were many cases of recognized disease of the nasal accessory sinuses which gave evidence of such prompt improvement through better drainage that the shortness of time alone would seem to preclude the possibility of this benefit being brought about in a more indirect manner.

(2) I have demonstrated by the use of a green skull that force applied across the palate can be made to separate the median palatine suture through its entire length, and also the intra-maxillary suture, and that the width of the nares can thus be increased. The pictures of a green skull so treated have been widely published, and the head itself with the suture separated, and the appliance in place was exhibited at the meeting of the American Medical Association in Chicago in connection with a paper read before the Section of Stomatology of that association. Moreover, the actual separation was accomplished

FIG. 17.



Shows that there was a marked separation between the nasal process of the superior maxillary and the nasal bone. In this case the change in the nose was evident to the naked eye and could be noted by digital examination also. The same condition has been noted in many cases of young patients when a wide separation has been required to correct nasal and maxillary conditions.

in the presence of reliable witnesses. This statement appears to be called for because I have been given to understand that others have not been successful in accomplishing a like result. Personally I do not consider this a very accurate test; there are many conditions pertaining to the character of the specimen, the

nature and direction of the force applied, as well as other questions, that may tend to alter the results in this kind of demonstration. It did, however, prove that when separation does take place along the line of this suture, as a result of force applied across the palate, it is complete, and the nasal chambers are correspondingly widened.

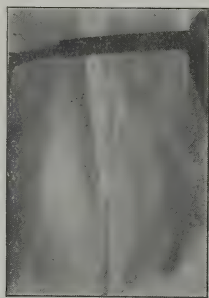
(3) I have had one case of fracture due to an accident with a motor-cycle the jar of which forced the lower jaw against the upper in such a manner as to force the maxillæ apart. In this case the maxillary bones were so widely separated that the overlying muco-periosteum was torn apart. The primary object in sending for me was to have the palate fissure closed. This, however, was unnecessary as soon as the bones were pressed together again. I have also been called into consultation in one other similar case in which there was separation of the median palatine suture as a result of an automobile accident. In both these cases there was fracture or dislocation of other facial bones which appeared to have been occasioned by the forcing apart of the upper maxillæ as a result of the traumatism. Each appeared to establish the fact that the force accidently applied immediately parted this suture, just as occurs more moderately when an appliance is used for the purpose.

(4) In one of my patients, a little girl of about eight or nine years, the forcible straightening of the nasal septum by the injudicious use of a nasal splint brought it down through the median palatine suture until its lower border could be felt upon the palate surface.

Fig. 18.

Skiagram of the mouth of a young man eighteen years old, taken exactly twenty days after the separating appliance was applied. In this case there was a marked perverted tendency as reported by his father, and a distinct improvement in his ability to study, which was shown as he continued his university course.

Fig. 19.

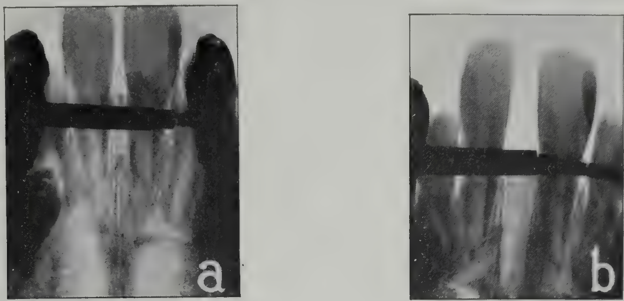


Skiagram of the mouth of a young man eighteen years old referred from the University of Wisconsin because he failed to keep up with his work during the first semester. After expansion he was enabled to continue attendance and make satisfactory progress. Increase in growth during the succeeding year was noticeable. He also had good health and a freedom from colds and bronchial trouble such as he had never previously enjoyed.

(5) Not infrequently there is a marked depression, sufficient at least to indicate the absence of bone tissue, that may be noted by external examination above the central incisors when they have moved apart in the course of maxillary separation as described, and occasionally in the central portion of the palate the change in the central suture may be recognized by digital examination. Occasionally the line along this division may also be observed in an impression of the mouth taken immediately after the removal of the appliance when for any reason a wide separation of the

maxillary bones has been found necessary.

Fig. 20.



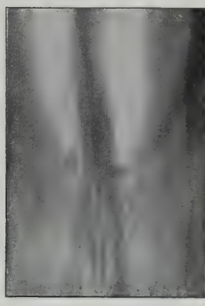
A B

Skiagrams of the mouth of a girl eight years old. A, Showing appliance in place but before pressure has been applied—taken June 29, 1913. B, The same mouth July 29, 1913. This result might have been secured much earlier except for delays which occurred by the patient's being out of the city.

Fig. 21.

Skiagram of the mouth of a boy twelve years old who was a chronic sufferer from hay-fever, headaches, bronchitis, and general nervous conditions, particularly noticeable in winking of the eyelids. Marked improvement in all these symptoms followed widening of his upper dental arch in July 1912. The skiagram of his palate was taken January 11, 1913. The thick black line along the line of the median palatine suture seems to indicate new bone formation in that region. During these six months his growth in height was increased two and three-quarter inches.

Fig. 22.



Skiagram of the palate of a young man twenty-eight years old for whom wide separation of the median palatine suture was performed, with great benefit to nasal and general pathologic conditions; taken two years afterward. The thick dark line shown where new bone had formed in the line of the formerly separated median palatine suture, proves that the osteogenetic layer of the palatal periosteum does become active under these conditions and that new bone formation results.

(6) The patients themselves almost invariably recognize the difference in nasal breathing, and this improvement occurs when other evidences indicate that the nose has been widened and the volume of air correspondingly increased at each inhalation. The degree of the change is naturally governed by the condition of the nasal mucous membrane, which may be rapid or slow or variable in its response.

(7) Patients also commonly report

feeling the effect of pressure high up in the nasal and maxillary regions when the nut is turned tightly after the maxillæ have been separated.

(8) Rhinologists' examinations almost invariably disclose that there has been an immediate enlargement of the breathing-space. Practically all such patients in my practice are referred to rhinologists for examination as soon as the incisors are moved apart sufficiently to warrant the belief that there has been a noticeable change within the nose.

(9) The X-ray invariably gives pictures such as Figs. 14–20.

(10) Fig. 22 shows the radiograph of the central portion of the palate of a man twenty-eight years of age whose upper maxillæ were widely separated because of marked intranasal deformity and nasal disease associated with pathologic conditions of the nasal accessory sinuses and a debilitated general state which precluded physical effort. All these symptoms have since almost entirely disappeared. This radiograph, taken two years after his mouth was expanded, shows a dark, broad line which seems to indicate that bone has been developed along the line of the interspace between the bones separated through the median maxillary suture, just as one would be led to expect would occur under any other similar condition.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

SUPERNUMERARY TEETH IN THE MOLAR REGION IN MAN.

By Prof. Dr. BOLK, Amsterdam.

(Read before the F. D. I., at its annual meeting, held in Amsterdam, Holland, August 30, 1913.)

[*Translation by the* DENTAL COSMOS.]

FOR several years I have been occupied with exhaustive studies concerning the development of dentition in the primates, including man. This field of investigation, as is well known, presents a number of unsolved questions. Moreover, the investigator in this field, perhaps more than in any other, soon becomes convinced that thorough investigation independent of the prejudices of current opinions leads to new questions, suggested by new points of view that are based on heretofore unknown facts. Several treatises containing the results of my investigations in this field have appeared in German. It is not my intention, however, to speak on any one of the problems that I have treated in my previous publications, but I desire to discuss a phenomenon to which, owing to circumstances to be explained in detail, my attention has only recently been directed, and which I have not treated heretofore, either by pen or by word of mouth.

THE WRITER'S UNIQUE COLLECTION.

Before proceeding to take up the subject of the occurrence of atavistic rudimentary teeth in the molar region in man, a few remarks should be made concerning the odontological collection of my Institute, which will at the same time explain the reason for the selection of this subject. These collections are extraordinarily rich in regard to the anomalies of dentures and individual teeth, and normal dentures. Owing to particular conditions which need not be

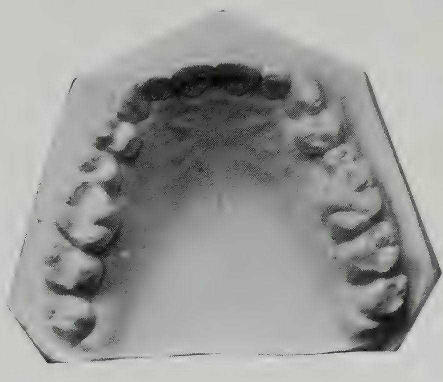
explained here, I have had during the last year the rare fortune to be able to examine more than 35,000 skulls. From this number I have collected all the normal complete and unworn dentures, with the result that at present I possess 350 maxillæ and 300 mandibles with complete and entirely perfect dentures. It is needless to suggest what a fruitful source this material offers for investigations not only of the dentition, but also of the entire bony structure of the mouth. In addition I have collected about 3000 well-preserved and hardly or not at all worn samples of each tooth of our dentition, which afford me a fairly complete survey of the variations in the size, shape, and structure of the teeth. I have also collected an extraordinarily large number of anomalies in the make-up of dentures, of which I shall give an illustration with the aid of two examples which will at the same time elucidate the immense value of this material toward the solution of theoretical and practical problems.

TENDENCY TO PERSISTENCE OF THE SECOND DECIDUOUS MOLAR.

In one of my odontological treatises which appeared some years ago, I for the first time pointed out the importance of the observation that now and then in the human mandible the second deciduous molar is *not shed* and replaced by the second premolar. In the maxilla, also, this occurs, but in this situation it must be regarded as extraordinarily rare, because here more frequently the second deciduous tooth is shed, but not replaced by a permanent tooth.

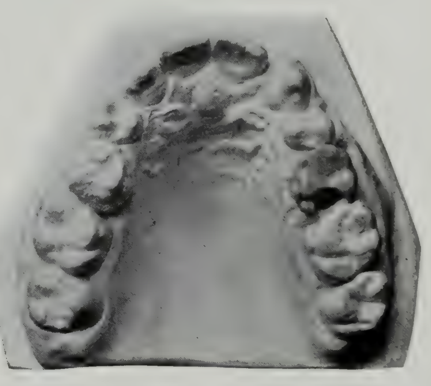
The persistence of the lower second deciduous molar is an extremely interesting phenomenon from a theoretical as well as from a practical point of view. Theoretically it has been maintained that this persistence is due to lack of space for the permanent tooth. It is hardly necessary to point out that this statement is entirely without foundation, and is contradicted by the very fact that the mesio-distal dimension of the second premolar is smaller than that of the deciduous tooth to be shed. Neither can heterotopy of the second premolar be regarded as the cause in this case, as will be shown directly. For then this anomaly would be of pathological character, which is by no means the case; on the contrary, this anomaly is of a

Fig. 1.



progressive nature. As I have shown in the above-cited treatise, it is in the progress of the further development of our dentition that the second premolar disappears, while in its place the second deciduous molar will persist.

Fig. 2.



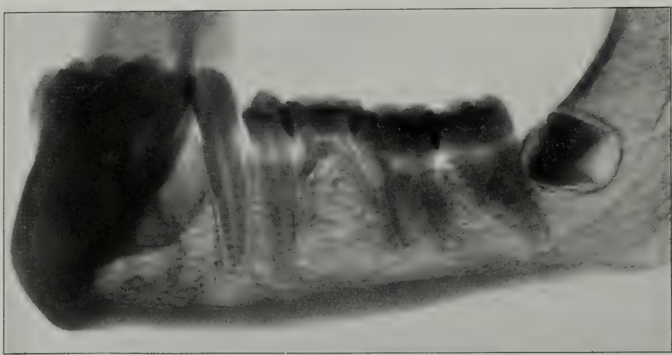
Hence there are three teeth in our dentition which are on the road to reduction and elimination, viz, the upper lateral incisor, the second premolar, and the third molar. Fig. 1 presents a denture in which these three teeth are still present, but, as will be noticed, in greatly reduced form. Fig. 2 shows a second

denture in which these three teeth are entirely absent, the second deciduous molar having become persistent.

So much for the maxilla. As has been said, in the mandible the absence of the second premolar is less rare than in the maxilla, yet here it is almost always observed simultaneously with the persistence of the second deciduous molar. This variation is of a progressive nature, as I have shown at length in the treatise cited, in which I have evolved a new theory regarding the genesis and future of our dentition.

This theory, which I have called the theory of the terminal reduction of the tooth rows, has been criticized in the November 1912 issue of DENTAL COSMOS, at page 1198, by R. C. Osburn of Columbia University, whom I would request to study my theory once more, but in its original text. His opinion would then surely be of greater value than his adverse criticism, which is based entirely upon a review published in a German journal and written not by myself but by some person entirely unknown to me, and who seems to have been unable to grasp the arguments which I have adduced in support of my view. It is usually wise to be somewhat skeptical in regard to the impartiality as well as the completeness of reviews, and not to base upon them criticisms regarding new points of view. Every author has a right to be read personally and not be criticized upon the strength of conceptions held by a third person regarding a writer's opinion. I trust I may be pardoned for the digression, but I cannot refrain from raising a warning voice against this unworthy practice, which seems to be spreading.

FIG. 3.



THE PROBLEM OF EXTRACTING ANY PERSISTENT DECIDUOUS TOOTH.

A practical consideration of the persistence of the second deciduous molar, as previously observed, gives rise to the question as to whether it is advisable to extract any persistent deciduous tooth. This question cannot receive an answer that holds good for all cases, and the practitioner will have to judge each case individually. In all instances of persistence of the second deciduous molar, however, the same line of procedure can probably be followed: it is a technical error to extract this tooth as long as it is intact, and if it is no longer intact, it is to be regarded as an element of the permanent dentition and is to be preserved as long as possible like any other permanent tooth. The purpose of extraction is to remove an impediment against the eruption of the permanent tooth and to facilitate this eruption. In order to attain this purpose, however, the presence of the second premolar is necessarily essential. Investigation shows, however, that the second deciduous molar

persists owing to the total absence of the second premolar, not even its germ being present.

In proof thereof I have selected twenty-six mandibles from adults, partly from very old persons [demonstrating], in which the second deciduous molar has persisted, mostly on one side, in several cases on both sides. To every mandible a radiograph thereof has been attached, and it can thus be convincingly seen that in not one of them is the slightest trace of a second premolar present. One of these cases is shown in Fig. 3. If in any of these cases, then, the second deciduous molar had been extracted, a gap would have been created in the tooth row which could never have been filled. It is unnecessary to elaborate further upon the consequences of such operative interference. From my collection, then, one which is probably unequaled by any other institution in regard to number of specimens, the extraction of a second deciduous molar is unmistakably to be stigmatized as malpractice. The degree of resistance of such a deciduous molar is elucidated by cases in which the first and even the second permanent molars were lost, while the second deciduous molar remained firm in the jaw. I have also noted the case of a person who shed this tooth at about the sixty-fifth year.

The second group of anomalies exhibited [demonstrating] bears an entirely different character. In these eighty or more cases the permanent canine has not erupted—which condition, as we know, is frequently associated with the persistence of the deciduous canine. This anomaly, which I have observed in the maxilla only, must most assuredly be regarded as a pathological phenomenon, as is generally agreed. These specimens exhibited show that in these cases the permanent canine is always present, but is situated in faulty position either buccally or, as more frequently, palatally, in the palatine portion of the maxilla. In these latter cases, moreover, this tooth has very frequently deviated in both directions and in an ever-recurring typical manner, lying with its vertical axis more or less horizontally in the palate. It seems therefore that a certain mechanical influence during its development forces this tooth to assume this position.

These two groups of cases have been selected merely to give an idea of the wealth of my odontological collection, and we shall now proceed to discuss our special subject.

ANOMALIES IN THE SHAPE AND NUMBER OF TEETH.

The anomalies in the human dentition are divided into two main groups, viz. anomalies in the shape of the teeth and anomalies in the number of teeth (Bateson's "Numerical Variations"). This latter group can again be subdivided according to the kinds of teeth in which these anomalies occur. It is my purpose to draw special attention to the numerical variations in the molars of man. Two such anomalies have been described in the literature, the more frequent one being the retrogression in number owing to non-development of the last molar. This retrogression in number, as we know, occurs in about ten per cent. of individuals in the white race. The second anomaly is much rarer, viz. increase in the number of molars due to development of a so-called fourth molar which appears behind the third one. In the mandible, especially, the occurrence of such a fourth molar is extremely rare —at least in the white race. This conclusion I have reached owing to the fact that I possess only one single specimen of a fourth molar in the mandible, but a fairly large number in the maxilla, as appears from the group of specimens exhibited [demonstrating]. I presume that in dark races this fourth lower molar is not as exceptionally rare as in the white race.

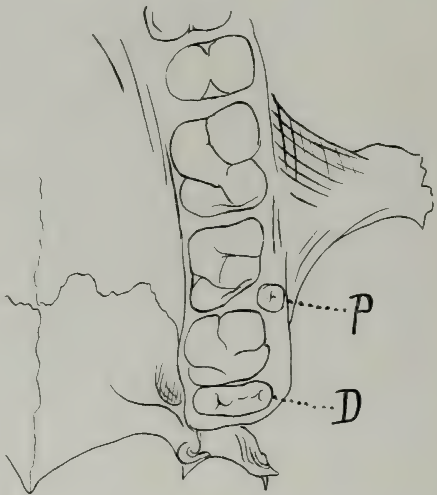
"THE PARAMOLAR"—A NEW ANOMALY.

Besides the two variations mentioned, a third variation occurs in man which so far has not been described as an anomaly of special character. Now and then a small, more or less rudimentarily developed tooth appears buccally of the molars. This anomaly, which some practitioners know from experience, is usu-

ally regarded as a so-called fourth molar which during its development has been displaced laterally by some cause or other and has erupted laterally of the normal molar row. And here I would concede that anyone who has observed but one or two such cases may easily be led to this most plausible view. If, however, one has at his disposal such extraordinarily comprehensive material, and observes not only the anomaly just now described but also the other anomalies in the molar region, he will arrive at an entirely different opinion. It appears that this supernumerary on the buccal side of the molar row represents a variation of the greatest importance for the problems of the phylogeny of our dentition. For I hope to be able to prove convincingly that this lateral supernumerary tooth and the so-called fourth molar, which is found behind the normal third molar, are not identical. To simplify my description from the beginning, I shall introduce distinctive terms, calling "paramolar" the rudimentary tooth which is situated laterally of the molar row, and the "distomolar" the tooth situated back of the third molar, which by other writers is called the fourth molar.

I have pointed out before that such a distomolar in the mandible is an extremely rare anomaly. The same is to be said of the paramolar, for I have not been able to find this as a really independent tooth in the mandible. As I shall explain, however, at greater detail, the paramolar frequently occurs in fusion with one of the normal molars, and in this form it occurs also in the mandible. Before entering more closely upon the topography and anatomy of the two kinds of supernumerary molars, I shall investigate the question as to how far the paramolar and the distomolar are to be considered as two entirely different variations. A proof could be very easily furnished by such cases in which both variations occur simultaneously. Distomolars, however, occur rarely enough in the dentition of the European, and a paramolar is a no less rare variation. The probability, therefore, that both variations occur simultaneously in one and the same individual is extremely small. Nevertheless I have been fortunate to note one such case among the more than thirty thousand skulls that I have examined. A part of this specimen is illustrated in Fig. 4. The paramolar, P, which is situated in the corner between the second and third molars, has a typical, ever-recurring shape of which we shall speak later, while the distomolar, D, is larger and is compressed in a mesiodistal direction. This case is so self-evident that there can no longer be any

Fig. 4.



doubt as to the correctness of my contention that in man two entirely different supernumerary teeth may occur in the molar region, one of which is situated laterally of the normal molars, the other back of the third molar. After ascertaining this, we shall now consider in detail the topography and anatomy of both of these supernumeraries.

"THE DISTOMOLAR," OR FOURTH MOLAR, SO CALLED.

Little need be said regarding the distomolar, since it has been often illustrated and described in the literature as the so-called fourth molar. Suffice it to point out that, in the skulls examined, I have never found this supernumerary

tooth in other than a rudimentarily developed form—partly as in Fig. 4, compressed in a mesio-distal direction; partly, and probably in the majority of cases, as a simple, more or less cylindrical tooth. (See Fig. 5.) In my collection of distomolars from monkeys, however, beautiful completely developed specimens are to be found. The significance of this difference we cannot discuss now. The distomolar is not always situated regularly back of the third molar, but is frequently displaced from the row. But it is very significant that, whenever such a displacement has occurred, the distomolar is deviated lingually, as illustrated in Fig. 6. We shall briefly discuss this item later on.

FIG. 5.

FIG. 6.

THE PARAMOLAR.

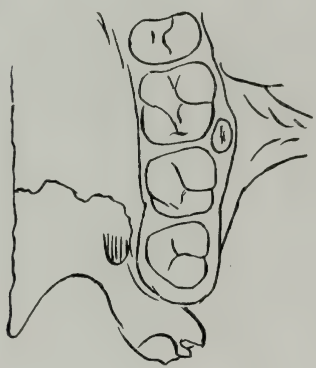
Its shape. The paramolar, as has been said before, is always of an extremely simple shape. The crown never exhibits more than two small and little developed cusps, which in most cases are very indefinite, the center of the crown exhibiting only an insignificant depression, so that one cannot speak of a cuspule. Furthermore this tooth never possesses more than one single root. This simple structure is of considerable significance in connection with the problem of the phylogenetic value of this supernumerary tooth.

FIG. 7.

Its situation. The second point which is of special significance in the discussion of this question is the situation of the paramolar, which may be called a typical one. The paramolar is almost always situated in the corner between the second and third molars, thus alternating with these two molars. (See Fig. 7.) Only in extremely rare cases do we find a paramolar situated more anteriorly, and then in the corner between the first and second molars. In my collection there are only two such cases, one in a plaster model, the other in a natural specimen.

(See Fig. 8.) This is a strikingly small number when compared with the great number of cases in my collection in which the paramolar alternates with the second and third molars. Yet these two cases are of special value, since they furnish additional proof that the paramolar cannot be a so-called fourth molar displaced anteriorly. For it is hardly probable that such a fourth molar, which surely originates after the third—that is, a comparatively long time after the first and second molars have originated and have reached a certain degree of development—should be displaced anteriorly to the level of the first molar.

Fig. 8.



OCCURRENCE OF TWO PARAMOLARS IN MAN.

But even aside from this point, the fact that a paramolar sometimes appears laterally between the first and second molars suggests the question as to whether such a paramolar is identical with that which is found laterally between the second and third molars. One might be of the opinion that this is the case, and that the supernumerary tooth, originating laterally of the normal molar row, under mechanical influences assumes such a position as to be least in the way, viz, in the majority of cases, between the second and third molars, very rarely between the first and second molars. I am not of this opinion, however, being convinced that in man we are dealing with two paramolars, one of which occurs only very rarely as an independent tooth, and is situated laterally between the first and second molars, and another which occurs between the second and third molars. I shall distinguish the two by calling them anterior and posterior paramolars.

The reasons for this assumption are derived from another series of phenomena in the molar region, to which I shall now call attention, coming back to the above question later on.

FUSION OF SUPERNUMERARY MOLARS: THE PARAMOLAR TUBERCLE.

So far, we have discussed exclusively the occurrence of a supernumerary molar as an entirely independent tooth laterally or posteriorly to the normal row of teeth. These supernumerary teeth occur, however, more frequently in concrescence with one of the normal molars. When this fact has once been recognized, several deviations from the normal in the structure of the crowns of molars, that heretofore appeared to baffle explanation, become comprehensible.

As we know, a more or less well developed supernumerary cuspule occurs now and then on the buccal side of the second and third molars. These supernumerary or fifth cuspules have frequently been illustrated and described in dental literature. Paul de Terra calls them simply buccal cusps, and he is entirely justified in considering them as a small supernumerary tooth that has grown together with the normal molar. I am of the very same opinion, and shall henceforth designate this cuspule by the term "tubercle," since it is simply a paramolar that has grown together with the normal molar.

Owing to my comparatively large collection of molars with such tubercles, I am in a position to make more definite statements regarding their occurrence.

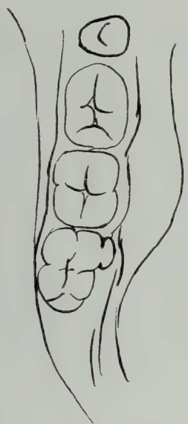
FREQUENCY OF OCCURRENCE OF THE PARAMOLAR TUBERCLE.

As to the occurrence of this tubercle in general, only this much need be said:

The paramolar tubercle occurs considerably more frequently in the maxilla than in the mandible. That it may, however, occur also in the mandible is illustrated in Fig. 9, which has been drawn from one of the specimens in my collection [specimen exhibited]. I would repeat, in this connection, that I have never observed an independent paramolar in the maxilla.

A second peculiarity is that, in the upper first molar, I have never observed a paramolar tubercle, while in the upper second molar it is not of very rare oc-

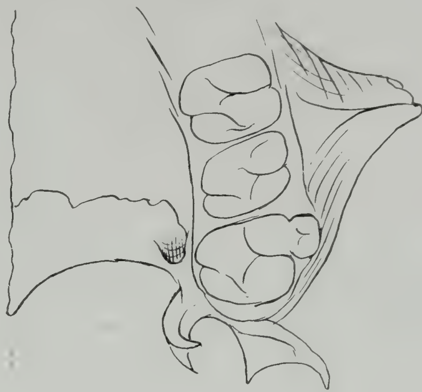
FIG. 9.



currence. It would require, however, too much time to discuss at length the significance of this phenomenon. I shall therefore merely point out that the absence of a paramolar tubercle in the first molar is easily explained in view of the fact that our first molar—as I have demonstrated in my "Theory of the Terminal Reduction of Tooth Rows"—is none other than the third deciduous molar of our primeval types. The relationship between this fact and the absence of a tubercle in the first molar, which De Terra has also pointed out, I shall not discuss at this time.

Another peculiarity which deserves mention is that I found the paramolar tubercle more frequently in the second than in the third molar. Putting together all the cases that I have been able to collect, the ratio is about two to one. From this it appears that this difference cannot be merely the consequence of the process of reduction, but that there must be other causes back of

FIG. 10.



it. In this connection I would recall the fact that an independent paramolar, a so-called anterior paramolar, occurs extremely rarely laterally between the first and second molars. If one coincides with my opinion that the paramolar

FIG. 11.

tubercle and the paramolar are identical, then the difference in frequency becomes apparent. For it is natural then to assume that the anterior paramolar occurs so rarely because, more frequently than the posterior paramolar, it undergoes concrescence with the molar, form-

ing a paramolar tubercle. The posterior paramolar occurs more frequently, while the paramolar tubercle in the third molar is rare.

which it has concresced. This relationship is extremely interesting. Figs. 10 and 11 show two cases from my collection, the one an upper third molar, the

FIG. 12.

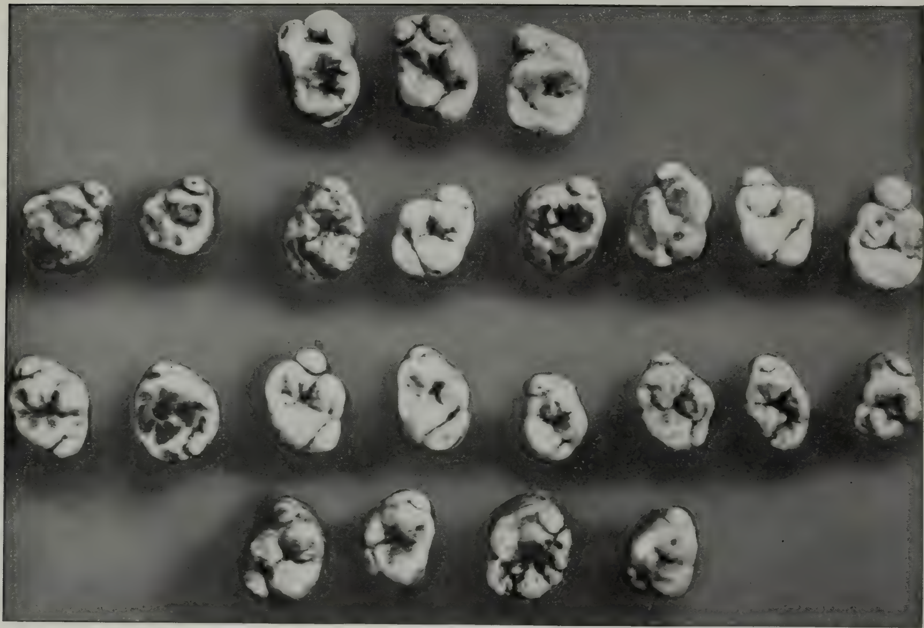


FIG. 13.

RELATIONSHIP OF THE PREMOLAR TUBERCLE TO THE MOLAR.

Having discussed the frequency of the occurrence of the paramolar tubercle, we shall now examine more closely its shape and its relationship to the molar with

other an upper second molar, each with a paramolar tubercle. In both cases the supernumerary cuspule has grown together with the anterior buccal cusp of the molar. It is most significant that this is a general rule. In Fig. 12 twenty-three upper second molars are repro-

duced, and in Fig. 13 twelve upper third molars. As far as we can judge, the paramolar tubercle is always concresced with the anterior buccal cusp of the molar. In the third molar, it has been found in one single case that the cuspule was displaced a little more distally, approaching the fissure separating the anterior and posterior buccal cusps. It is hardly necessary to point out once more that the cases reproduced in these photographs have not been specially selected, but give a faithful image of actual conditions. It may therefore be assumed as a general rule that the paramolar tubercle, when it does occur, is found at the anterior buccal cusps of the last two upper molars.

This typical situation of the paramolar tubercle in the molar is a phenomenon which is closely related to the typical situation of the paramolars in relation to the molars. The anterior paramolar is situated in the corner between the first and second molars, hence is in contact with the anterior buccal cusp of the second molar; the posterior paramolar is situated in the corner between the second and third molars, hence is in contact with the anterior buccal cusp of the third molar. Every paramolar therefore concresces with the anterior cusp of the distally situated molar. While I fully recognize the cause of this phenomenon, I would have to go into details regarding the evolution of our molars to explain it fully—for which, unfortunately, time is lacking.

In Figs. 12 and 13 we note a few cases in which the paramolar tubercle does not occur in the simple form heretofore described; these are the three molars in the top row in Fig. 12, and the last two molars of the bottom row in Fig. 13. In these cases undoubtedly an accessory tooth is concresced with the buccal surface, in which two cuspules can be plainly distinguished. At times, as in two of the molars of the top row in Fig. 12, these appear as separate cuspules concresced with the molar. These cases form the transition between an independent paramolar and a simple paramolar tubercle. They prove that in reality this paramolar tubercle is nothing but the same supernumerary tooth which I have termed paramolar, which, however, under some influence, has become fused with the molar posterior to it. This fact is still more clearly evinced by the cases in which the paramolar, though concresced with a normal molar, clearly retains its own root.

If all cases in man in which one of the posterior molars in the maxilla exhibits a paramolar tubercle—and, judging from my collection, this occurs in about one per cent. of individuals—were considered as one case in which a supernumerary tooth had originated in the molar region, and if one added the cases of genuine, independent paramolars, then it would be shown that such a supernumerary tooth is not of such extremely rare occurrence.

THE OCCURRENCE OF TWO PARAMOLARS.

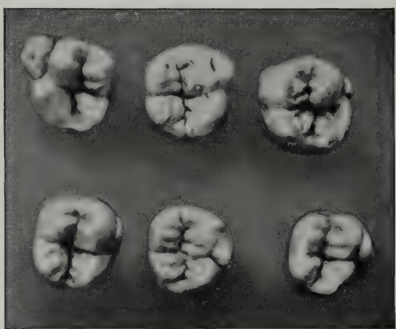
After having thus established the identity of the paramolar and the paramolar tubercle, I return to the question raised above as to whether the supernumerary tooth originating in the maxilla always represents the same element, or whether one can distinguish two paramolars, viz, an anterior and a posterior one. I would therefore recall that I have termed "anterior paramolar" that which is situated between the first and second molars, and "posterior paramolar" that which is situated between the second and third molars. This question could be answered definitely by one single case in which both paramolars occurred on the same side of the jaw. Yet, as I have pointed out before, a so-called anterior paramolar is of the greatest rarity, and a simultaneous occurrence of the two can therefore hardly be expected. The probability, however, of a simultaneous occurrence of a paramolar tubercle in the second and third molars, or possibly that of a paramolar tubercle in a second molar simultaneously with the posterior paramolar, is much greater. Of this latter combination I have an actual example in my collection, as may be seen in Fig. 14. The paramolar tubercle is situated in its typical place on the buccal surface of a second molar, which in

addition shows a Carabelli tubercle. Laterally behind the second molar we note a small paramolar. If one is of the opinion, like myself, that the para-

FIG. 14.

molar tubercle is really nothing but a paramolar concresced with a molar, then this case furnishes an absolute proof that, in man, two supernumerary teeth—viz, an anterior and a posterior—may originate laterally to the molar row and alternating with the molars.

FIG. 15.



This fact at the same time decides the question as to the dentition to which the permanent molars in man belong, whether to the first or the second. I shall refrain from answering the question here, because it would necessitate a detailed discussion of the significance of the first permanent molar in man. This much, however, should be said—that the above-mentioned phenomena regarding supernumerary teeth prove the correctness of my former contention that the first molar in man, as in all catarrhine primates, has become a permanent deciduous molar.

RARE OCCURRENCE OF A PARAMOLAR TUBERCLE IN THE MANDIBLE.

So far only the occurrence of a paramolar tubercle in the maxilla has been discussed, and we shall now subject the mandible to a close examination. In the molars of the mandible also, a paramolar tubercle occurs now and then, though more rarely than in those of the maxilla. One of my cases is illustrated in Fig. 15. The occurrence of the paramolar tubercle in the lower molar coincides in two respects with their occurrence in the maxilla: First, this tubercle does not occur in the lower first molar, and second, this tubercle is connected with the anterior buccal cusp in the lower molars also. The latter is shown in Figs. 15 and 16, the former showing several lower second molars with a paramolar tubercle, the latter several lower third molars with such a tubercle.

FIG. 16.

CHARACTERISTIC PARAMOLAR ROOT IN THE MANDIBLE.

As has been said before, the paramolar tubercle does not occur as frequently in

the mandible as it does in the maxilla. On the other hand, we find in the lower molars the phenomenon of a supernumerary tooth in concrescence with the normal molar, which I have not been able to establish with certainty in the maxilla. Whenever a paramolar tubercle occurs in one of the lower molars, then this tubercle frequently proves its original significance of being an independent tooth by its possessing a proper root, which I would term "paramolar root." In upper molars this occurs very rarely. In the lower molars, however, it happens not infrequently that no tubercle is present in the crown, but instead we find the supernumerary root, the "paramolar root." In proof thereof, in Fig. 17 some twenty lower molars are reproduced. In the top row no paramolar tubercle is to be noted, yet we observe how the paramolar root gradually becomes longer and stronger, until in the last molars of this series it is as long as the two normal roots. The second row shows seven molars in which the paramolar root is still more strongly developed than in the top row; this root is seen to be situated on the buccal surface of the tooth, starting from the crown as an independent root, the crown itself no longer exhibiting any trace of a paramolar tubercle. Not every lower molar with three roots, however, should be classed with this group, because bifurcation of the anterior root may have taken place. If one has an ample collection of specimens at his disposal, he can readily decide whether the presence of three roots in a lower molar is due to bifurcation of the anterior root or to the addition of a paramolar root. In the bottom row in Fig. 17, seven molars are reproduced, in which, besides the paramolar root, the paramolar tubercle on the crown is also developed. The last three molars in the bottom row, especially, show that the paramolar tubercle and the paramolar root belong together.

Fig. 17.

Summing up, we find that an independent paramolar is very rare in the mandible, but it is more frequently concresced with one of the molars than in the maxilla. The presence of this accessory tooth in the mandible is, moreover, frequently emphasized by a super-

numerary root, while in the maxilla it is more often manifested by a supernumerary tubercle.

The paramolar tubercle as well as the paramolar root occurs in the second and third lower molars. As in the maxilla, the conclusion will therefore have to be drawn that, in the mandible also, two paramolars alternating with normal molars may originate.

THE DISTOMOLAR AND ITS RELATIONSHIP TO THE POSTERIOR PARAMOLAR.

My observations regarding the supernumerary elements occurring in the molar region in man would not be complete without a brief discussion of the distomolar. I presume that I have succeeded in proving that the paramolar and the distomolar are not identical. How far they are related phylogenetically, is a question which we cannot discuss at length this time. A few words, however, should be said concerning the occurrence of concrescence of the distomolar with the third molar, for this concrescence occurs just like that of the anterior paramolar with the second molar, or that of the posterior paramolar with the third molar. How, then, are we to distinguish between concrescence of the distomolar with the third molar —for naturally only this molar can be involved—and concrescence of the posterior paramolar with the third molar? This query can be easily answered if one remembers the above-mentioned fact that the distomolar, unless it be situated in the prolongation of the dental arch, always exhibits a tendency to displacement lingually. (*Cf.* Fig. 6.) Whenever there is concrescence between the distomolar and the third molar, I have always observed that this takes place with the disto-lingual cusp of the third molar. In proof thereof, Fig. 18 shows a lower third molar from my collection with a distomolar tubercle, and Fig. 19 an upper third molar with such a tubercle. The free distomolar shown in Fig. 6 represents the transitional stage to the distomolar concresced with the upper third molar shown in Fig. 19. Thus it appears that it is not difficult to decide in a third molar whether we have to deal with a concresced paramolar or a distomolar: the former concresces with the mesio-buccal cusp, the latter with the disto-lingual cusp.

FIG. 18.

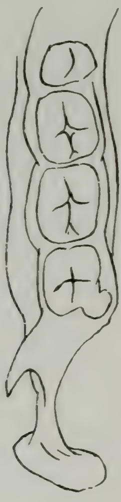
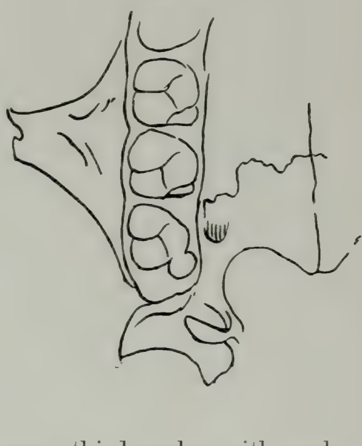


FIG. 19.



CONCLUSION.

In the foregoing I trust to have furnished proof that the occurrence of supernumerary teeth in the molar region in man is not a haphazard phenomenon,

but subject to a certain regularity. This applies more especially to the relationship of these supernumerary teeth to the normal molars. It is this regularity that governs the direction of our thoughts and reflections in our endeavor to explain the significance for comparative anatomy of the phenomena illustrated. For I feel certain that neither in the paramolars nor in the distomolars are we dealing with accidental products of dentition, but with elements that are of the greatest importance for our conception of the problems involved in the genesis and final evolution of the molars. I should like to present my views regarding the phylogenetic significance of the paramolars and the distomolar, but this would lead too far into the details of comparative anatomy.

THE ETIOLOGY AND PROGRESS OF DENTAL CARIES.

By EDGAR D. COOLIDGE, D.D.S., Chicago, Ill.

(Read before Section III of the National Dental Association, at its annual meeting, Kansas City, Mo., July 8, 1913.)

IF it were possible to ask one who had lived during the period of the earliest records of civilization—about 3000 or 4000 B.C.—regarding the most accepted explanation of pain in a tooth, the reply would probably be that the one suffering had in some way offended the deity, and was doing penance for the offense. Such a brief and definite reply could not be given today for the cause of the most prevalent disease of mankind, known as dental caries. The passing years have seen many theories expounded, while scientific investigation has verified and contradicted, added to, and taken from these theories, through experiments, analyses, comparisons, and deductions. At this time a summary of the records of a vast amount of research work and of the opinions of scientific men shows that the trend of opinion seems to be drawing closer to an agreement that it is not an error of nature that such a disease is prevalent, but that nature has been interfered with by the progress of civilization along certain lines, and the remedy will probably be found in a return to more natural conditions, or by supplying such factors as are demanded by nature to prevent this disease.

THE PREVALENCE OF CARIES IN LIVING PRIMITIVE RACES, ACCORDING TO MUMMERY.

In the statistics compiled by J. R. Mummery in his investigation into the prevalence of caries in existing primitive races, the following classification is found.(1)

Race.	Percentage of skulls showing carious teeth.
Eskimos	1.4
Maoris	3.0
Indians, N. W. America Coast	3.9
Fiji Islanders	5.2
Northern Hindoos	5.9
North American Indians	9.5
Eastern Polynesians	11.4
Southern Hindoos	14.0
Zulus	14.2
Sandwich Islanders	19.0
Australians	20.5
Bushmen	20.6
Negros (slaves)	20.8

CARIES IN PREHISTORIC CRANIA (PATRICK).

The result of Patrick's(1) examination of prehistoric crania to be found in the various museums in America is as follows:

Race.	Number of teeth examined.	Percentage of carious teeth.
Asiatics (including Malays, Chinese, Japanese, Armenians, Hindoos, and Burmese	2,180	2.064
Egyptians and Africans	3,306	3.418
Polynesians and Australians	2,738	4.309
Central Americans	930	4.872
North Americans (including Eskimos)	27,362	5.093
South Americans (including Tierra del Fuegians and Guanches)	6,719	5.804
Europeans (including "a few modern soldiers")	3,422	7.079

CARIES AMONG MODERN SCHOOL CHILDREN.

Most of us are familiar with the results of the examinations of school children at the present time, and know what a large percentage of mouths with caries exists. In this country the average percentage is between 85 and 98 per cent. in which caries exists, and the same condition is found in all civilized countries where such examinations are being held.

COMPARATIVE STATISTICS.

The comparison of the first table of statistics made from skulls of adults of the primitive type, and those made from the mouths of modern school children, does not represent a true condition, and is not a fair comparison. However, in the case of the Maoris, an examination of the mouths of fifty school children, living under entirely European conditions, shows the presence of caries in 95 per cent. of mouths.(1) The Maoris have been under the influence of civilization less than one hundred years, and the habits of civilization have not been adopted until very recently.

Again, a summary of the statistics shows that—"The number of persons affected by dental caries who live under uncivilized or natural conditions is comparatively small, varying from 1 to 20.8 per cent., while in civilized modern races the proportion is as high as 98 per cent., the increase being at least 77.4 per cent.(1) It is not necessarily the progress of civilization which is responsible for such a change in the condition of the teeth, yet the habits of civilization, especially in regard to diet, are undoubtedly responsible to a very great degree.

HISTORICAL.

As early as 1530, the theory that the decomposition of food produces an acid which destroys tooth substance is recorded.(2) This was not a generally accepted theory at that time, for the records show that there were others, among which were the "worm" theory of the middle ages, and another theory of older times that it was due to a disturbance of the four principal humors of the body(1), both of which were accepted until quite recent times.

In 1835 Robertson(2) gave a description of caries similar to the one advanced in 1530, based on the chemical decomposition of food, and opposing the theory of some of the earlier writers in regard to dental gangrene—the inflammatory theory. This opinion was nearer to the present line of thought than any previous to that time, and much was developed along these channels in the years following. Underwood and Milles(2) began the work along the line of bacterial investigation, but Miller connected the two lines of thought and demonstrated the theory that prevails today in regard to the formation of acids and caries of dentin.

This theory has been called the "chemico-parasitic theory," the principal points of which are that there are acid-forming bacteria in the presence of carbohydrate food material, causing a fermentation of the carbohydrates, with lactic acid as a waste product of the process. The acid thus formed dissolves the calcium salts from the cement substance of the enamel, and the enamel rods fall apart. Both acid and bacteria enter the dentinal tubules, and the decomposition of the organic matrix follows.

Black has added to this the differentiation between caries of enamel and

dentin.(2) The dentin does not change form histologically or physically at first, the organic matrix being of sufficient amount and consistence to remain after the solution of the calcium salts. The softened matrix "acts as a dialyzing membrane," passing calcium lactate—a soluble salt—from the tooth to the mouth, and sugars from fermented carbohydrates into the tooth to the growing micro-organisms. The micro-organisms penetrate the tubules, "growing like a grapevine(2) through a lattice," and spread laterally along the dento-enamel junction—"therefore the tendency is to the formation of a conical area of decay, with the point of the cone toward the pulp of the tooth and its base against the dento-enamel junction."

As micro-organisms develop, they crowd into the tubules, and there is an enlargement of the tubules to receive them. "The enlargement of the dentinal tubule continues until the division walls disappear, uniting two in one, three in one, and so on, until there is nothing left but a mass of micro-organisms mingled with some undissolved shreds of organic matrix, which, if the cavity is exposed to the saliva, wastes out and is washed away."(2)

ETIOLOGY.

In a general way dental caries may be considered as having first, an exciting cause, and second, a predisposing cause.(3)

EXCITING CAUSE.

The exciting cause is twofold: Acid-forming bacteria, active, and fermentable carbohydrates, passive. The mouth always contains the first, and the environment is such as to produce growth in almost all cases where the second element is present, providing these bacteria be undisturbed. With the growth of these bacteria, there is a product of metabolism formed which causes the destruction of the tooth substance by a solution of the calcium salts of the enamel. The diastatic enzyme—ptyalin—and the product of metabolism of bacteria in the presence of carbohydrates have the power of converting carbohydrates into lactic acid. Lactic acid is considered as the force which attacks the enamel, producing the beginning of decay. ("American System of Dentistry," vol. i, p. 805.)

Before considering the predisposing cause, let us recall the definition of that term. According to Gould, it is "that condition of the body in which causes that leave other persons unaffected call forth an attack of disease in individuals predisposed. The term at the present time refers especially to susceptibility to infectious diseases, and implies a peculiar condition of the bodily juices or cells, in which these are unable to repel the invasion of pathogenic micro-organisms."

PREDISPOSING CAUSE.

There may be local and general predisposing causes. Local predisposing causes may be considered as those conditions of the surfaces of the teeth which lessen their resistance to the attack of the active force, and the environment of the teeth, which may be favorable to the action of bacteria upon carbohydrates to form lactic acid.

General predisposing causes are those influences of heredity and of bodily condition which lower the resistance of the teeth to attacks of bacterial action. Some hereditary influences may have their expression locally, as the inherited tendency to defective formation, irregularities of alignment, etc. The age and bodily condition with regard to systemic disorders influence the local environment of the teeth.

The study of the cause of caries involves two lines of investigation, one dealing with the active force that is ever present, and the other with the power or ability peculiar to the tooth and its environment to resist the attack of this force. Both these fields appear of equal importance in regard to the cause of caries and to the control of the disease. Whether the problem be solved by controlling the bacterial action, hastening the reduction of carbohydrates, or by increasing the resisting power of the teeth and their environ-

ment, matters little; the control of this condition is the goal sought for.

CARIES OF THE ENAMEL.

The beginning of dental caries must necessarily be on the enamel surface. The studies and investigations of Miller were mostly made along bacteriological lines, and upon caries of dentin. Williams came to the conclusion, after a long series of investigations, that human teeth are more perfect than those of animals, and he was opposed to the view that imperfections of structure had anything to do with decay. He agreed with the conclusions arrived at by Black from his investigation of enamel, which were: "Imperfection of the teeth, such as pits, fissures, rough or uneven surfaces, and bad forms of interproximal contact, are causes of caries *only in the sense of giving opportunity for the action of the causes that induce caries*," and again, "These points are all insufficient to explain the facts clinically observed, or the wide variations that are presented in the disposition of caries to attack the teeth of different individuals." (DENTAL COSMOS 1895, p. 416, and 1897, p. 177.)

The conclusions drawn from the observations of Williams and Black in regard to the importance of the surface imperfections of enamel were very similar, in that such imperfections have little to do with the resisting power of the teeth. Williams summarizes his article in these words:

"If environing conditions of the teeth are such as to favor the development and activity of acid-producing bacteria, and if those bacteria are permitted to become attached to the surface of the enamel, it is doomed, although it may be the most perfect that was ever formed. On the other hand, if these environing conditions are not present, the worst enamel will not decay." (DENTAL COSMOS 1897, p. 374.)

The observations of Pickerill on the enamel have led him to the conclusion that the condition of the surface of the enamel is a very important factor in susceptibility to caries and in the resistance of the enamel to attacks of acid products. He lays a great deal of importance upon the difference in the surface of the enamel, having observed that the teeth in which the most decay is to be found have peculiar characteristics, which differ from the teeth in which very little decay is found. In classifying these characteristics, he terms the teeth free from decay as sclerotic, and those in which much decay is found as "malacotic," and the teeth of uncivilized races where very little decay is to be found, he terms "native teeth."(1) He shows how these types of teeth differ from each other in their surface analysis, and that the malacotic teeth are very much more uneven and rough than the other two types. This unevenness, which he terms "imbrication lines," he shows to be interdependent with the striæ of Retzius, and his opinion is that they are caused by "checks in the secretive function of the ameloblasts . . . . due to the pressure of the bony walls of the crypt in which the tooth is developing—*i.e.* the resultant of two forces of evolution: (1) Hereditary tendency of the ameloblasts to continue functioning to a certain definite extent. (2) Limiting force of environment, expressed as a diminution in the size of the jaws—*i.e.* the result of altered habits of diet, and also to some extent of natural selection." He also found that the different types of teeth vary in their resistance to the action of acids. Head has shown that a 1 in 20,000 solution of acid calcium phosphate would soften enamel more than the same acid of greater strength (DENTAL COSMOS 1907, p. 804), and also that a 1 in 1000 lactic acid solution will soften enamel more than a 1 in 500 solution, while even a 1 in 20,000 solution will soften enamel as much as a 1 in 500 solution. (DENTAL COSMOS 1910, p. 46.)

Pickerill found a greater significance in the action of acids of the same strength upon the different types of teeth. His conclusions on enamel investigation are—

(1) That the enamel of teeth varies appreciably as to surface structure, hardness, density, permeability, and solubility.

(2) That these variations are measurable, and in all cases bear a distinct relationship to the clinical classification of teeth into sclerotic and malacotic types.

(3) That this difference is not wholly developmental, but is *partly* acquired.

(4) The difference in surface structure is, of course, wholly developmental. A nearer approach to the "native" type, and therefore a more highly resistant enamel, is to be attained by a more physiological use of the jaws in very early infant life, this continuing especially during the time that the roots of the deciduous molars are developing, in order to stimulate both the growth of the jaws and the full development of the tooth germ and crypt.

(5) The difference in density and permeability are probably partly acquired, and are dependent on the osmosis of lime (calcium) salts from the saliva.

(6) Finally, in order to obtain enamel of the highest resistance to caries, it is necessary to promote those conditions, hygienic, dietetic, and prophylactic, which will insure—(*a*) The normal development of the enamel organ to its fullest exent, and (*b*) that the phosphates and other lime (calcium) salts shall remain in solution in the saliva for as long a time as possible. (Pickerill, p. 115.)

Some of these conclusions are in accordance with those of Miller, especially in regard to the resistance depending "to a certain extent upon the structure of the tooth, upon the perfection of the external enamel crust, the enamel cuticle, and upon its freedom from fissures, bruises, cracks, or weak lines such as are produced by uncalcified prisms." (DENTAL COSMOS 1905, p. 39.)

PLAQUE FORMATION.

The existence of the gelatinoid plaque has been thoroughly demonstrated by Black, Williams, and Miller. There is no doubt as to its presence, nor that it is a factor of great importance affecting localization of caries. Increased activity and greater virulence of the micro-organisms protected by the plaque is found in almost all cases, and it would seem that in the control of such plaques might be found the correction of the disease.

Miller did not place as much importance upon plaque formation as did Black and Williams. He claimed that —"Caries occurs at points which cannot be kept free from accumulations of food, *i.e.* at points which are not kept mechanically cleansed. Films are likewise found under exactly the same conditions, and consequently films and caries must occur together, but we are hardly justified, by this fact, in making one of them dependent upon the other. If there is any interdependence at all, it is just as natural to suppose that the softening of the surface of the tooth produced by a beginning decalcification furnished a more ready opportunity for the attachment of the film." (DENTAL COSMOS 1902, p. 441.)

Black says regarding plaques: "It may be laid down as a principle that for caries to begin in the enamel of the teeth anywhere, the caries fungus, which forms an acid, must be attached to the surface of the enamel in some such way as to prevent the acid which it forms from being readily washed away and dissipated in the general fluids of the mouth." (Black, "Operative Dentistry," vol. i, p. 75.) Williams stated during his investigation that decay is the "result of some specific cause acting continuously at some particular point in a manner impossible to free acids in the mouth." (DENTAL COSMOS 1897, p. 294.) His conclusions were (as previously quoted) that "If those bacteria are permitted to become attached to the surface of the enamel, it is doomed, although it may be the most perfect that was ever formed." Yet plaques are found upon teeth immune to caries, as well as upon teeth where there is arrested caries. It is also possible to find them where there is no acid decalcification beneath the plaque. Kirk says this is explained by the fact that there are certain requisites necessary to produce acid decalcification, and if one of these is wanting, there will be no decay, although the plaque be present. He further states that plaque formations differ in character, and may be produced by bacteria other than those causing decay. Therefore he concludes: "As one of the important, and I believe the direct means of localization of the decay pro-

cess in caries susceptibles, the precipitation of mucin by the secreted lactic acid appears to be a prominent factor." (DENTAL COSMOS 1910, p. 736.) Jones (*Dental Review* 1911, p. 1176) also has placed a great amount of emphasis upon the precipitation of mucin in plaque formation. The first action of the acid product of carbohydrates is to precipitate mucin, which forms upon the protected surface of the tooth, producing the film and furnishing protection to the bacteria. Pickerill does not consider the plaque of any great importance in the cause of caries save as occurring under the same circumstances that favor lodgment of infectious and carbohydrate material. His conclusion from his study of the enamel surface is that microscopic pathological departures from the normal structure lessen the resistance and favor adhesion of foodstuffs and micro-organisms.(1) So it seems universally recognized that plaques are present with caries, but some difference of opinion still exists as to their importance as causative factors of caries, as well as to their structure and formation.

ENVIRONING CONDITIONS.

Most writers on caries seem to be agreed that caries is dependent upon the environment of the teeth. Black writes (DENTAL COSMOS 1895, p. 416): "Caries of the teeth is not dependent upon any condition of the tissues of the teeth, but on conditions of their environment." In another place he says: "The active cause of caries is a thing apart from the teeth themselves, acting upon them from without, and, from a consideration of the facts thus far developed, the logical inference is that the cause of the differences in the liability of individuals to caries of the teeth is something in the constitution, operating through the oral fluids and acting upon the active cause of caries, hindering or intensifying its effects." One of the significant features in this statement is that it shows that the same trend of reasoning was activating Dr. Black's mind then, as in his latest work published on "Salivary Calculus," regarding the importance of the saliva and its constituents in all pathological conditions about the teeth.

Miller and Williams both express themselves as believing in the importance of the environment of the teeth as a factor of dental caries. Kirk also writes on the conditions of the saliva as a causative factor of great importance in caries. In fact, almost every investigator has stated his belief in this direction, and with such a consensus of opinion it would seem that the goal is closer than ever before, when we can have such a knowledge of the cause of this condition that a control of it will be more easily effected.

THE SALIVA.

The most important factor of the environment of the teeth is the saliva. The teeth are bathed in this fluid of the secretive glands of the oral cavity constantly, and although there are many conflicting opinions regarding the effect which it has upon them, yet the general trend seems to indicate that a more thorough knowledge of its peculiarities will bring light upon many of the pathological conditions of the mouth. Black's final words of his paper on "Deposit of Salivary Calculus" were—"The examination of the saliva and other secretions, in conjunction with the urine, seems to be demanded." (*Dental Review* 1912, p. 350.)

The saliva is "extremely variable in its composition and amount, but these do not occur without reason," says Pickerill.(1) This seems to be in accordance with the opinion of many others who have studied this field. Kirk says: "It is because of this variability in the salivary composition that the importance of the saliva as an index of the general nutritional state of the individual has come to be recognized."(8) Kirk also reasons that, on account of the sensitiveness of bacteria to alterations of the culture medium, any changes in the composition which are brought about by the state of the nutrition would necessarily influence the activity of bacterial growth in different mouths and in the

mouth of any individual at different times.[8] Reasoning from such an hypothesis, it would seem that, with a normal fluid present, capable of changes in its composition which hinder the growth of acid-forming bacteria, a knowledge of the conditions which cause these changes to occur and the ability to produce them at the proper time should aid materially in the control of the disease. This immediately suggests the question, What are the changes possible to be produced, and how may they be brought about?

In 1906, Low renewed the examination of the saliva for potassium sulfocyanate, and the same investigation was continued by Waugh. Their conclusions were that the absence of KCNS and the presence of dental caries was always noticeable—which led them to believe that the presence of KCNS had some protecting influence. Hugenschmidt (DENTAL COSMOS, October 1896) experimented to find the effect of KCNS in retarding the growth of bacteria, and found no effect. Miller also regarded the effect of KCNS as of very little importance. (DENTAL COSMOS 1903, p. 11.) The disagreement of these last-named investigators with the former seems to be justified when considering the result of their experiments. Bunting claims that the ferric chlorid test for KCNS as used by Low and Waugh is of little value. in that an ethereal solution of the dried saliva should be used, and that other substances beside KCNS may be found in the saliva which will give the same color test. One of these substances, he says, is diacetic acid.

Pickerill disagrees with Bunting on both of these points. In regard to the presence of diacetic acid, he says it is only found where pathological conditions exist, such as Bright's disease. This view is substantiated by other medical authorities. He does not consider the presence of KCNS of so great importance as some other elements. Pickerill has placed great importance upon the amount of saliva secreted per minute and the alkalinity per cc., using different foodstuffs and other stimuli to stimulate secretion. (See tables on pp. 136, 144, 151, 173 and 184 of Pickerill's work.) He has made extensive experiments, and his mucin deductions are very convincing of the importance of the secretion stimulated by natural means to keep the teeth bathed in a fluid intended by nature to protect the parts it washes. He reasons that higher civilization has brought about two conditions which favor a decreased salivary secretion; first, increased mental excitement, and second, decreased bodily exercise.[1] He found that all acid foods. such as contain tartaric acid, have a very great stimulating effect upon both the amount and the alkalinity of the saliva. Such food as bread produces less than the normal amount of flow, and less than the normal amount of alkalinity per cc. and per minute, while such foods as oranges and apples would produce about seven times as much saliva as normal. and eight times the amount of alkalinity. Another impressive point is that, fifteen minutes after the cessation of stimulation with acid diet, both the amount of secretion and the alkalinity index are from two to three times the normal. He also found that the food which produced this increase of flow and alkalinity also increased the amount of most of the elements to be found in normal saliva. Such elements as ptyalin, potassium sulfocyanate, phosphates and chlorids are shown to be increased in amount by acid diet, while mucin shows a decrease in amount. In mouths where a thick, viscid, or ropy saliva is found, caries is generally prevalent. Pickerill says this abundance of mucin "may possibly be regarded as an effort by nature to provide a material which, if precipitated, would undoubtedly protect painful surfaces against acid stimuli." Precipitated mucin will undergo an alkaline decomposition in the presence of saliva, when carbohydrates are not present, but the "organisms attack the carbohydrate in preference to the mucin, and an acid reaction develops, until the carbohydrate is all used up." He makes the following conclusion from his study and experiments with the saliva—"That in the saliva is provided a natural and potentially perfect mouth-wash, acting

continuously day and night—not merely for a few minutes a day; that it is, moreover, completely under control; that it may be altered or varied in amount or composition; that its beneficial effects may be increased or decreased absolutely at will."[1]

FOODSTUFFS AND THEIR EFFECTS UPON SALIVA AS AN IMPORTANT FACTOR IN THE ETIOLOGY OF CARIES.

The active cause of decay, *i.e.* micro-organisms and carbohydrates, can probably never be eliminated. If this is the case, it seems that the study of conditions that increase the resistance to the action of this cause is the most inviting at this time. If fermentation of carbohydrates is the source of the acid-producing decay, a study of foods would seem to have much importance in finding the cause of decay and the remedy as well. Hastening the fermentation to exhaust the supply of carbohydrates before the flow of an alkaline saliva might cease would have a protecting influence on the teeth. If all solutions or preparations for cleaning teeth were of a nature to stimulate the flow of saliva—and a saliva of increased alkalinity—does it not seem reasonable to believe that it would be a hindrance to the causes of decay?

The conclusions of Pickerill on the study of foods are—"That in order to prevent the retention of fermentable carbohydrates on and between the teeth, and so eliminate, or very considerably reduce the carbohydrate factor in the production of caries, starches and sugars should on no account ever be eaten alone, but should in all cases either be combined with a substance having a distinctly acid taste, or they should be followed by such substances as have been shown to have an alkaline potential; and the best of these are, undoubtedly, the natural organic acids found in fruits and vegetables."

This consideration of the importance of the diet is substantiated by Kirk, Black, and others. Kirk says (DENTAL COSMOS 1910, p. 736), "Finally, as the composition of the saliva upon which caries depends is a factor of nutrition dependent upon food habit, decay of the teeth is a diathetic expression, and the desired immunity to its ravages can be attained only through attention to more intelligent and rational dietetic hygiene." The views of Dr. Black, as expressed in his article on "Deposit of Salivary Calculus" (*Dental Review* 1912, p. 336) show that he considers the control of deposits on the teeth possible by regulating the diet. There is doubtless some connection between the cause of deposits and the cause of decay.

In comparing the diet of civilized and uncivilized races, it is very noticeable that we have omitted much of the natural acid diet and many hard substances that are both stimulating and cleansing, and have substituted softer and more insipid articles or prepared foods that require little mastication and excite little flow of saliva.

SUMMARY.

(1) The active cause of caries is the presence of fermentable carbohydrates and acid-forming micro-organisms.

(2) The predisposing cause is a lowered resistance due to conditions brought about by changes of habits which have affected the development of the teeth and the condition of their environment, together with habits which do not aid, and often hinder, the process by which nature attempts to preserve or protect its creation.

(3) Plaques are an important factor in the localization of caries, but there is still some difference of opinion as to their importance as causative factors, as well as to their structure and formation.

(4) The condition of the saliva, which is controllable in regard to the presence or absence of certain elements which, if present in proper proportions, might have a protecting influence upon the surface of the teeth or a resistance to the action of bacteria, is an important factor.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

A FURTHER STUDY OF SULFOCYANATE IN ITS POSSIBLE RELATION TO DENTAL CARIES.*

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(Address, by the senior author, before the Dental Society of the State of New York, at its annual meeting, Albany, May 8, 1913.)

THE work about to be described has been conducted under the auspices of your Research Committee, and has been intended to solve some of the problems connected with the possible relation of sulfocyanate‡ to dental caries. The research has been both a continuation and an extension of the investigation we discussed in our last annual report.

I. SUMMARY OF THE GENERAL CONCLUSIONS IN LAST ANNUAL REPORT.

A year ago we communicated findings and deductions that may be briefly and very generally summarized in the following direct assertions (COSMOS, January 1913, pp. 42–53):

(1) Bunting's§ conclusion, that his ether-modification of the ferric chlorid test for

* To the substance of the address, as given in this official stenographic report of it, the authors have added various details which were suggested in a general way by the speaker and promised for this published account of the research. The experimental work was done in the Biochemical and Pharmacological Laboratories of Columbia University, at the College of Physicians and Surgeons, New York, under the auspices of the Research Committee of the Dental Society of the State of New York, Dr. William B. Dunning, chairman.

† The previous papers in this series, by Dr. Gies and collaborators, were published in the DENTAL COSMOS, as follows: 1910, lii, p. 1141; 1911, liii, p. 1324; 1913, lv, p. 40.

‡ Although the term *thiocyanate* is gradually replacing "sulfocyanate," we continue to use the older term for the sake of conformity in usage with previous reports on this subject by your research committees. "Sulfocyan*ide*" is obsolete.

§ Bunting: DENTAL COSMOS, 1910, lii, p. 1346.

sulfocyanate was more delicate than the classical procedure, was ill-founded. Bunting's opinion, that observed analytic differences in favor of the latter process were due to something important in saliva that was not sulfocyanate, *e.g.* diacetic acid, and which occurs in saliva quite regularly, was also untenable. (Page 42.)

(2) The classical ferric chlorid method, as well as Bunting's modification of it, is unsuitable for the *quantitative* determination of sulfocyanate in *tissues* (page 42). The Rupp, Schied, and Thiel* iodometric method, though detailed in procedure, is very accurate for such work. (Page 43.)

(3) Sulfocyanate occurs normally, in small proportions, in the blood and lymph, and in various other parts of the mammalian organism. Sulfocyanate is not a characteristic constituent of saliva or of salivary glands—it may be absent from both (page 45). The salivary glands are probably not producers of sulfocyanate, merely the outlets for its ejection from the blood, in some animals; for other animals, the salivary glands are not even excretory channels for sulfocyanate. (Page 50.)

(4) Our analytic data on the *distribution* of sulfocyanate "indicate strongly that, in dogs, sulfocyanate is produced in and excreted from the liver; that sulfocyanate circulates in the blood to all the usual channels of excretion; that sulfocyanate is eliminated from the blood in bile and urine. Our failure to detect sulfocyanate in the combined salivary glands from six dogs accords with previous observations to the effect that dog *saliva* does not contain sulfocyanate. The excellent condition of the average dog's teeth is an interesting fact for consideration by those who believe that caries in people is due to the absence (or reduction in the proportion) of salivary sulfocyanate. It is highly probable that the quantity of sulfocyanate (produced?) in the liver, and the proportion of that substance in the blood, in people, is much greater than that in dogs; and that, on this account, the salivary glands in people have opportunity and occasion to participate in the process of *excreting* sulfocyanate *from the blood*."† (Page 45.)

(5) Proceeding in the belief that sulfocyanate results in the body from a union of cyanogen (—CN) and sulfid (—SH) radicals, we obtained results which indicated that added amounts of simple substances containing or yielding —SH radicals did not markedly affect the excretion of sulfocyanate. Direct addition of —CN-yielding material to the small available supply of such substance in the body induced notable increases in the elimination of sulfocyanate (page 47 and Table III). "Since considerable —SH-sulfur results from ordinary metabolic transformations of proteins, it is probable that sulfur in such radicals is freely available at all times for any sulfocyanate synthesis that may tend to occur. On the other hand, the exceptionally violent toxicity of the —CN radical suggests that this radical never occurs normally in animals in proportions comparable with those of the —SH radical. Our experimental data accord with the opinion that the amount of sulfocyanate depends primarily on the available supply of the constituent radical which happens to occur in the body in the smaller proportion, namely the —CN radical." (Page 47.)

(6) "Our experimental data on the origin of sulfocyanate suggest strongly that sulfocyanate results from the metabolism of protein, that the liver is the organ chiefly concerned in the production of sulfocyanate, and that the salivary glands *excrete* rather than secrete sulfocyanate in saliva. If these views are correct, they suggest, further, why *no one has shown* that sulfocyanate, a *waste product*, bears any functional relation whatever to the teeth or oral membranes." (Page 49.)

(7) "No *rational* explanation has been offered for the supposed effects of sulfocyanate, in salivary proportions, on the formation of bacterial plaques or on bacterial growth or activity. Our first studies under your auspices* have convinced me that sulfocyanate does not, and, in the proportions of its occurrence in saliva, *cannot* appreciably retard the growth of oral bacteria, or impair their nutrition, or reduce their capacity to produce acid from carbohydrate." (Page 50.)

(8) Toxicological experiments yielded results which suggested that "dosage with sulfocyanate may be a dangerous procedure. They certainly indicate that the pharmacology of

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* Rupp and Schied: *Berichte der Deutschen chemischen Gesellschaft,* 1902, xxxv, p. 2191. Thiel: *ibid.* p. 2766. Edinger and Clemens: *Zeitschrift für klinische Medizin,* 1906, lix, p. 223.

† Such a difference would be analogous to a number of dissimilarities between human and canine metabolism, which are illustrated by the well-known discordance in the metabolism of nucleoproteins (and purins in general).

* Seaman and Gies: DENTAL COSMOS, lii, 1910, p. 1141.

sulfocyanate should be thoroughly understood by those who determine how much and how often sulfocyanate shall be administered" (page 53). "Our profound ignorance of the pharmacology of sulfocyanate should prevent us from proceeding empirically in its therapeutic use without due regard for considerations more immediately important, possibly, than those of preventing or curing or alleviating dental caries by such dubious means." (Page 51.)

(9) "Our results strongly suggest an extension of this work along the several lines I have indicated. They emphasize especially the need for thorough determinations of the hidden effects of doses of sulfocyanate that produce no gross toxic symptoms—doses given to mammals, and particularly to men who would volunteer to submit to such treatment after its possible dangers were clearly and fairly indicated." (Page 53.)

II. A Further Inquiry into the Chemical Origin of Sulfocyanate.

The concluding paragraph in the foregoing series of quotations from our last report indicates the spirit and scope of the work we have lately been doing under the auspices of your Research Committee.

A year ago our conclusions regarding the *chemical* origin of sulfocyanate were based on theoretical considerations to some extent, but, in the main, upon positive influences of —CN-containing (or -yielding) substances on the production (and excretion) of sulfocyanate in dogs. We had successfully completed nine experiments with—Sulfur (2), sodium sulfid (2), taurin (2), thiourea (2), and cystin (1), all *sulfur-containers,* with results that were mainly negative in this connection; but, in the time that remained before your meeting last May, we were able to conduct only four experiments with —CN-containers (or -yielders): Acetonitril (1), alanin (1), and glycocol (2).

The generally positive indications with the latter substances, coupled with the fact that our experiments with them were comparatively few, led us, in harmony with the suggestion quoted above, to extend the work in this direction at our first opportunity.

Accordingly, proceeding by the methods that were detailed in our last report, we have studied the effects in five additional experiments on sulfocyanate production and excretion, in dogs, of the administration of the following amino-acids and nitrils: alanin (1), leucin (1), acetonitril (1), mandelic-acid nitril (1), and amygdalin (1). The results have emphasized the findings and conclusions reported a year ago.

The chemical formulas of these five substances are appended:

$$CH_3{-}\underset{}{\overset{NH_2}{\overset{|}{C}}}H{-}COOH$$

Alanin

$$\begin{matrix}CH_3\\ CH_3\end{matrix}\!\!>CH{-}CH_2{-}\overset{NH_2}{\overset{|}{C}}H{-}COOH$$

Leucin

$$CH_3{-}CN$$

Acetonitril

$$C_6H_5{-}\underset{\underset{OH}{|}}{C}H{-}CN$$

Mandelic-acid nitril

$$C_6H_5{-}\underset{\underset{O-C_{12}H_{21}O_{10}}{|}}{C}H{-}CN$$

Amygdalin

In Table I we summarize the analytic data of these five new experiments, with the results published a year ago; and, in addition, present information on the quantities of sulfocyanate per 100 grams of mass involved in every case in each of the twenty experiments.

A detailed inspection of the analytic data, *especially the calculated values per hundred grams of material,* reveals a slight though distinct tendency on the part of the sulfur-carriers, as a group, to augment the production of sulfocyanate*; and shows a decided increase

* Pollak found, in experiments he failed to describe, that the administration of sulfur,

TABLE I. Data pertaining to the Production and Distribution of Sulfocyanate* in Normal Dogs and in Dogs Under Various Conditions of Treatment.†

Dog.		Period.	Dosage.			Urine.			Feces.			Blood.			Liver.			Bile.			Stomach Contents.			Intestines and contents.					
						Average per day.																		Small.			Large.		
							KSCN*			KSCN*			KSCN*			KSCN*			KSCN*			KSCN*			KSCN*			KSCN*	
No.	Wt.	A—Preliminary. B—Dosage.	Days before dosage.	Days of dosage.	Substance given.	Vol.	Total	per 100	Wt. dry.	Total	per 100	Wt	Total	per 100	Wt.	Total	per 100	Wt.	Total	per 100	Wt.	Total	per 100	Wt.	Total	per 100	Wt.	Total	per 100
	kilos.				grams.	c.c.	mg.	mg.	gm.	mg.	mg.	gm.	mg.	mg.	gm.	mg.	mg.	gm.	mg.	mg	gm.	mg.	mg.	gm.	mg.	mg	gm.	mg.	mg.
I. Distribution of Sulfocyanate in Normal Animals: "Control" Experiments.																													
(1)	12.1	. .	0	0	. . . .	405	3.9	0.97	34	8.7	26.1	765	17.8	2.4	280	10.7	4.0	9	3	33.	128	0	0	589	9.6	1.75	175	5.5	1.2
(2)	11.8	. .	0	0	. . . .	361	3.8	1.08	30	8.2	24.7	635	20.4	3.3	230	12.2	5.3	4	0	0	172	0	0	595	9.4	1.56	147	8.7	3.4
II. Distribution of Sulfocyanate after the Administration of Sulfur and Substances Containing Sulfur, chiefly —SH-yielders.																													
(3)	11.4	A	5	. .	. . . .	482	3.7	0.81	42	8.6	21.5																		
		B	. .	7	Sulfur (35)	384	4.0	1.07	67	10.4	15.5	653	27.6	4.2	258	25.8	**10.3**	17	3.2	19.2	110	0	0	253	10.3	4.12	127	8.7	6.8
(4)	8.7	A	5	. .	. . . .	290	3.0	1.03	40	9.1	22.5																		
		B	. .	7	Sulfur (35)	300	3.7	1.23	51	9.6	19.2	580	22.5	3.9	297	21.6	7.2	22	4.0	20.	128	0	0	295	11.2	3.4	55	5.4	**10.8**
(5)	6.9	A	5	. .	. . . .	268	2.8	1.12	26	4.9	19.6																		
		B	. .	5	Sodium sulfid (0.75)	278	4.0	1.44	32	7.9	23.7	508	38.8	**7.8**	236	27.0	**12.0**	29	3.7	12.	131	3.5	2.7	328	20.6	5.2	152	16.2	**10.8**
(6)	8.2	A	11	. .	. . . .	290	2.5	0.80	34	5.8	17.4																		
		B	. .	5	Sodium sulfid (0.75)	316	4.5	**1.50**	35	7.4	23.2	467	42.4	**9.4**	267	22.7	**9.0**	25	0	0	126	4.3	3.2	289	17.5	**5.9**	172	10.2	5.6
(7)	8.4	A	8	. .	. . . .	276	4.0	1.03	35	7.3	21.9																		
		B	. .	4	Taurin (2.5)	295	5.8	**1.93**	43	8.9	22.1	475	28.5	**6.7**	275	15.1	7.5	18	0	0	207	0	0	305	15.4	5.1	162	9.7	6.4
(8)	8.6	A	8	. .	. . . .	310	4.3	1.40	32	6.1	18.3																		
		B	. .	4	Taurin (2.5)	301	5.0	1.66	45	9.6	24.1	505	24.6	**4.9**	244	12.7	4.9	28	0	0	195	0	0	327	17.2	4.2	155	7.5	5.0

(9)	7.9	B	. .	6	Thiourea (32.5)	261	2.5	1.01	31	5.9	17.7	470	20.7	**7.6**	263	17.5	7.1	30	4.6	**23.0**	170	0	0	285	20.3	**6.8**	160	7.1	4.1
(10)	8.0	B	. .	6	Thiourea (32.5)	268	2.7	1.04	39	6.3	15.5	465	19.4	**4.8**	185	22.8	**12.8**	20	3.7	18.5	222	0	0	305	17.6	5.5	146	8.3	5.6
(11)	7.8	A	3	. .	. . . .	183	2.1	1.20	30	3.2	9.8	. .	. .	. .							. .	. .		. .	. .	. .			
		B	. .	7	Cystin ‡ (6.5)	186	2.5	1.40	28	3.4	10.4	. .	. .	. .	242	24.7	**9.8**	32	4.4	13.2	. .	. .	0	. .	. .	. .	84	9.2	**11.2**

III. Distribution of Sulfocyanate after the Administration of Amino Acids and Nitrils, chiefly —CN-yielders.

(12)	9.2	B	. .	5	Glycocol (5)	308	3.5	1.15	36	7.9	23.7	510	29.3	**5.8**	. .	. .	. .	. .	. .	. .	170	0	0	385	27.5	4.9	163	17.2	**10.9**
(13)	6.5	A	2	. .	. . . .	155	1.8	1.12	20	2.5	12.5																		
		B	. .	5	Glycocol (16.5)	148	6.1	**3.03**	21	6.2	**31.0**	380	20.4	**5.4**	192	17.3	**8.7**	20	5.3	**26.5**	142	0	0	207	11.2	5.6	141	12.7	**9.7**
(14)	7.9	A	6	. .	. . . .	238	2.7	1.08	36	4.4	13.2																		
		B	. .	5	Alanin (24)	293	6.1	**2.01**	40	5.5	13.5	410	21.8	**5.4**	243	18.7	7.4	21	6.2	**31.0**	105	0	0	348	25.4	**7.2**	61	10.3	**17.1**
(15)	6.36	A	3	. .	. . . .	138	2.3	1.61	23	0.7	2.9																		
		B	. .	6	Alanin (16.0)	146	3.2	**2.33**	29	1.4	4.3	472	28.5	**6.0**	205	21.9	**10.9**	27	4.4	16.3	72	0	0	169	17.4	10.3§	. .	. .	. .
(16)	6.2	A	3	. .	. . . .	123	2.6	2.04	9	1.1	12.1																		
		B	. .	4	Leucin (2.55)	137	2.8	1.89	21	1.5	7.5	412	14.2	3.5	174	Lost	. .	32	3.9	11.7	93	0	0	228	11.7	5.2§	. .	. .	. .
(17)	10.8	A	2	. .	. . . .	230	3.1	1.30	40	9.3	23.0																		
		B	. .	5	Acetonitril (2.5)	284	5.9	**2.12**	35	8.6	25.8	560	47.0	**8.4**	287	18.4	6.7	16	6.5	**45.5**	142	0	0	340	21.5	**6.14**	144	10.6	**7.6**
(18)	4.7	A	3	. .	. . . .	139	2.4	1.71	12	0.9	7.1																		
		B	. .	6	Acetonitril (4.6)	146	3.8	**2.52**	21	1.0	9.4	344	31.7	**9.0**	195	27.5	**13.5**	20	7.9	**39.5**	105	0	0	248	29.3	11.7§	. .	. .	. .
(19)	7.2	A	4	. .	. . . .	196	2.7	1.35	30	1.3	4.3																		
		B	. .	5	Mandelic-acid nitril (2.45)	182	3.7	**2.06**	39	1.9	4.7	375	34.4	**5.2**	184	21.05	**12.0**	34	9.2	**27.6**	70	0	0	237	17.4	7.5§	. .	. .	. .
(20)	5.42	A	4	. .	. . . .	161	2.4	1.53	18	1.0	5.2																		
		B	. .	6	Amygdalin (3.8)	160	2.7	1.70	23	1.2	4.7	372	18.5	**4.9**	174	8.4	4.8	17	2.7	16.2	75	0	0	244	19.5	7.8§	. .	. .	. .

* Contents of sulfocyanate are expressed as milligrams of potassium sulfocyanate. † Experiments 1 and 2 were "controls." Experiments 3–11 were planned to determine effects of sulfur and sulfur-containing substances. Experiments 12–20 tested effects of three CN-containers and three typical amino acids (products of protein metabolism, —CN-yielders). ‡ Crude cystin. § Data for combined contents of small and large intestines.

in the formation of sulfocyanate, as a result of the administration of aceto-nitril and mandelic-acid nitril. Amygdalin, though a —CN-container, was without effect. We have indicated, in Table I, with bold-faced numerals, the data which appear to us to be the most significant.

The two ordinary nitrils and amygdalin (a nitril-glucosid), referred to in Table I, *contain* —CN radicals and exchange them in metabolic reactions. The three amino-acids, alanin, glycocol, and leucin (Table I), do not *contain* —CN radicals; but Plimmer* found that, by suitable oxidation, two of these amino-acids *yielded hydrocyanic acid* (HCN) in the following proportions: Glycocol, 11.1 per cent.; leucin, 0.68 per cent.; alanin, 0.

Our results on sulfocyanate production, from leucin, accord with Plimmer's purely chemical finding in this connection, *i.e.* a small quantity of a substance which at best yields little —CN, *leucin,* failed to influence the formation of sulfocyanate. Our results with glycocol are in general harmony with Plimmer's observation, but our positive findings with alanin do not accord with the negative expectation from Plimmer's data in this connection, unless we assume that the increased production of sulfocyanate (following the introduction of the *comparatively large amounts of alanin*) was due to a special formation of —SCN radicals *from other amino-acids that were available in the body* at the time, and which, "spared" in part from their usual fate by the ready substitution for them of some of the excess of administered alanin, were free to contribute in small degree to the production of sulfocyanate. This is a very reasonable view of the matter. Just as carbohydrate may "spare" protein from metabolic consumption when carbohydrate is eaten in abundance, so an excess of one amino-acid might be able to protect portions of an available supply of another amino-acid, in the nutritional exchanges.

The small amount of amygdalin that could be given satisfactorily during the six days of experimentation, contained so slight a proportion of —CN radicals (5.1 per cent.) that the negative finding with respect to sulfocyanate production in this connection is explained on that basis alone.

Our new observations emphasize the conclusions we stated a year ago on the chemical origin of sulfocyanate, and place our deductions on this matter upon a broader and more substantial basis.

Our general conclusion that sulfocyanate arises in the body from a union, directly or indirectly, of —SH and —CN radicals is not original with us nor has it been resurrected by us; it is a current theory which has received much verbal attention though little experimental study. The following facts from biological and chemical literature support the view our experimental data have indicated in this connection (A–H):

(A) Proteins are converted into amino-acids by the normal processes of *digestion* and *assimilation.* Amino-acids are absorbed from the intestines into the blood, distributed to the tissues, and used by the cells.

Proteins yield prussic acid (HCN) by various *laboratory methods* of decomposition that involve chemical processes similar to those which are operative in the animal body. Amino-acids also yield —CN-products of analogous kinds under similar laboratory conditions.

The sequence of changes involved in the possible production of —CN radicals from proteins and amino-acids *in metabolism,* by elimination of carbon dioxid and subsequent oxidation, is suggested by the following formulas:*

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sodium thiosulfate, sodium xanthogenate, and cystein did not increase the urinary excretion of sulfocyanate. *Beiträge zur chemischen Physiologie und Pathologie,* 1902, ii, p. 430.

* Plimmer: *Journal of Physiology,* 1904, xxxi, p. 65.

* Besides our own finding that glycocol ($CH_2—NH_2—COOH$), when administered to dogs, increased the production of sulfocyanate, are the similar observations of Willanen (*Biochemische Zeitschrift,* 1906, i, p. 129), to the effect that administration (to rabbits) of glycocol itself, as well as of the

$$R—CH—NH_2—COOH \xrightarrow{-CO_2} R—CH_2—NH_2 \xrightarrow{+O_2} R—CN+2H_2O$$

(B) When —CN-compounds of mineral types, such as potassium cyanid (KCN), are introduced into the body, sulfocyanate (—SCN) is speedily produced from them. When certain —CN-compounds of organic nature, such as acetonitril (CH_3—CH) are administered, the production (excretion) of sulfocyanate is increased. (See footnotes †, ‡, also under *, next page.)

The conversion, in the body, of certain —CN-compounds into —SCN-products, presumably by combinations with —SH radicals, accords in principle with the well-known reactions outlined by the following chemical equations:

(1) $$S + NaCN = NaSCN$$
Sulfocyanate produced from sulfur and sodium cyanid by fusion

(2) $$(NH_4)_2S_2 + NaCN = NaSCN + 2NH_3 + H_2S$$
Sulfocyanate produced in an aqueous solution of yellow ammonium sulfid and sodium cyanid by boiling

bolic changes, or which may be administered. These radicals appear to be hydrolyzed into corresponding organic acids (salts); but are also eliminated unchanged, or modified into forms that are less toxic and promptly excreted, *e.g.* sulfocyanate. (See the concluding equations in section E below.)

(D) When a given quantity of sulfocyanate is introduced into the body, practically all of it is excreted in the urine.* This fact gives further emphasis to the opinion that sulfocyanate is purely an *excretory* product.

(E) The production of —SCN-compounds from —CN-substances in the animal body appears to be a physiological method of *detoxification*—a *defensive measure* similar to the detoxification, in the liver, of indol resulting from intestinal putrefaction, into indican, a normal urinary constituent. The quantities of sulfocyanate that normally occur in animal tissues and fluids appear wholly devoid of toxic influence.

(C) Nitrils (organic cyanids) in the form of glucosids (such as amygdalin and phaseolunatin) are produced abundantly in plants and may easily be isolated from them:

$C_6H_5—CH—CN$, with $O—C_{12}H_{21}O_{10}$ on the CH
Amygdalin

$CH_3—C—CN$, with CH_3 above and $O—C_6H_{11}O_5$ below the C
Phaseolunatin

Plants convert —CN radicals into innocuous and useful forms such as these glucosids.

Nitrils have never been detected in normal *animal* tissues, although they seem to occur transiently in animal cells. The highly toxic character of —CN-compounds suggests that the *proportion* in which they appear at any place in the body is always exceedingly small under normal conditions. Animal organisms do not *retain*, in any form, —CN radicals that result from meta-

That the production of sulfocyanate is a defensive process may be inferred from the findings published by Lang,† and Heymanns and Masoin.‡ These investigators found that when sodium

glycocol-yielders, adenin and creatinin, caused increased urinary excretion (production) of sulfocyanate.

* Pollak: *Beiträge zur chemischen Physiologie und Pathologie*, 1902, ii, p. 430.

† Lang: *Archiv für experimentelle Pathologie und Pharmacologie*, 1894, xxxiv, p. 247; 1895, xxxvi, p. 75.

‡ Heymanns and Masoin: *Comptes rendus de la Société de biologie*, 1896, x, p. 26.

thiosulfate was promptly injected under the skin or into the circulation of rabbits or dogs to which potassium cyanid had been given, a *protective* action of the thiosulfate made it possible for the animals to *withstand the effect of three or four times the fatal dose of cyanid.* Sulfocyanate was produced in this detoxification by a process that apparently involved oxidation:

$$KCN + Na_2S_2O_3 + O = KSCN + Na_2SO_4$$

Malonitril $(CH_2)_3{=}(CN)_2$ was not only detoxified in this way, but toxic symptoms which had been induced by its administration were effectively alleviated by the prompt introduction of thiosulfate, which acted as an antidote, sulfocyanate being formed in the process.* The injected thiosulfate, in these massive doses, seemed to react with the cyanid as other sulfur-carriers, normally present in the organism, act upon the traces of nitrils that result from protein metabolism.

The general steps in the conversions of organic cyanids (nitrils), into (1) organic acids (salts) or into (2) sulfocyanate, as the changes may occur in normal metabolism, are suggested by the following equations:

(1) $$R{-}CN \xrightarrow{+H_2O} R{-}CONH_2 \xrightarrow{+H_2O} R{-}COONH_4$$

[Nitril hydrated into amide, then into acid (salt).]

(2) $$HS{-}R + R{-}CN = HSCN + R{-}R$$

[Sulfid (from protein) and cyanid (nitril) yield sulfocyanate.]

The first of these two reactions occurs, at best, to a slight degree. The second appears to represent the main process of protection against the influence of —CN-compounds.

(F) The HS— in the hypothetical "HS—R"-substance, suggested below, appears to be derived from protein. When protein or any of its —SH-containing metabolic derivatives (*e.g.* cystin) is heated with sodium cyanid, sulfocyanate is formed. Hydrogen sulfid is ejected from protein by caustic alkali and is evolved abundantly during the putrefaction of protein.

Protein yields numerous —SH products *in metabolism* and *in intestinal putrefaction,* among them thio-amino acids, that are *abundantly available* for use in physiological detoxification of —CN-compounds, with resultant production of sulfocyanate.

(G) Not only does the introduction of certain —CN-containing materials increase the output of sulfocyanate by the defensive changes indicated above; but, sulfur-containing substances, when introduced into the body, may unite with —CN radicals there available and markedly increase thereby the output of sulfocyanate, as is shown to some extent by the results of our own experiments, but especially by those of Bruylants,* who noted increased excretion of sulfocyanate in human urine after the inhalation of carbon disulfid. It is possible, however, that in the case of carbon disulfid, the production of sulfocyanate results from a union of carbon disulfid and ammonium radicals, since sulfocyanate may be artificially produced by such a synthesis:

* See also Hunt: *Arch. internat. de pharmacodynamie et de thérapie,* 1904, xii, p. 447; *Journal of Biological Chemistry,* 1905, i. p. 33; *Bulletin No. 69, Hygienic Laboratory, U. S. Public Health and Marine-Hospital Service,* 1910, pp. 1–89.

* See Bruylants: *Jahresbericht der Thierchemie,* 1888, xviii, p. 134 (abstract by Herter).

$$CS_2 + 4NH_3 = NH_4SCN + (NH_4)_2S$$

[Production of ammonium sulfocyanate by heating carbon disulfid with alcoholic solution of ammonia.]

(H) All the essential radicals for the normal production of sulfocyanate *appear to be derived from protein or protein decomposition products.* Sulfocyanate has been obtained *directly* from protein by destructive distillation, by fusion with alkali, and by treatment with boiling caustic alkali.* It may be produced more abundantly by the decomposition of a mixture of protein and cyanid.†

III. Effects of Fasting, and Overfeeding with Protein, upon the Production and Elimination of Sulfocyanate.

In our last report we referred to the effect of fasting on the production and elimination of sulfocyanate, and said: "If sulfocyanate is produced from —CN radicals that are released in protein metabolism, the tissues and excretions would probably contain smaller proportions of sulfocyanate during a fast, because protein metabolism is thereby reduced to a minimum. We tested this matter by subjecting a normal dog weighing 8.46 kilos to a seven-day fast. At the end of that period the animal was completely exsanguinated by the method already described. There was marked diminution in the amounts of sulfocyanate in the urine, feces, and tissues,‡ in some cases to 50 per cent. of the 'normal' values." (Page 50.)

The experiment referred to in this quotation has been repeated, with similar results. Our analytic data for the first of these experiments were not published in our last report. We include them here with the data for a second fasting experiment and for a recent "overfeeding" experiment.

GENERAL PROCEDURE.

During the progress of each experiment the animal was confined in a metabolism cage of the kind described elsewhere.* The daily food was uniform in character and quantity for some time before the experiment was started as well as during the "fore" period of each experiment, and consisted of adequate amounts (per kilo of body weight) of the mixture of hashed lean meat (15 gm.), cracker-meal (4 gm.), lard (3 gm.), bone-ash (1 gm.), and water (35 cc.), which we have been using for years in nutrition experiments on dogs, to the greatest advantage in the work and to the highest satisfaction of the animals.† Throughout the "fore" periods, for two of the dogs, the total amounts of daily urine and feces were carefully determined and recorded; and the amounts of sulfocyanate in these excreta per day were ascertained. In this way the *normal* elimination of sulfocyanate, under the initial conditions of the experiment, was established. Fasting, or feeding with increased amounts of meat ("overfeeding"), was then begun and continued for a number of days, in accord with the general requirements of such work. Sulfocyanate, as before, was determined in the carefully collected urine and feces, for the purpose of ascertaining whether the nutritional change had affected its quantitative output.‡ Fi-

* Bruylants, *loc. cit.*, p. 136.

† Interesting discussions of some of the facts suggested above have been published in the last edition of Part 2 of the Neubauer-Huppert "Analyse des Harns für Mediziner, Chemiker, und Pharmazeuten," 1913, p. 746. See also Kahn: "Biochemical Studies of Sulfocyanates," Dissertation (Ph.D., Columbia University, 1912, chap. I). Neuberg: "Der Harn," 1911, p. 651. Röhmann: "Biochemie für Mediziner, Zoölogen, und Botaniker," 1908, p. 355.

‡ In this statement, the phrase "and tissues" was included by mistake.

* Gies: *American Journal of Physiology,* 1905, xiv, p. 403.

† Gies: *American Journal of Physiology,* 1901, v, p. 235; Steel and Gies, *ibid.*, 1907, xx, p. 343.

‡ The Rupp, Schied, and Thiel iodometric method was employed for the determination of sulfocyanate. See Rupp and Schied: *Berichte der deutschen chemischen Gesellschaft,*

nally, sufficient time having presumably elapsed for the registration of measurable effects on the production of sulfocyanate, the animal was bled to death from a femoral artery under local cocain anesthesia; and, after complete exsanguination, some of the blood and certain other carefully isolated parts of the body were analyzed for sulfocyanate, to determine whether the treatment had increased or decreased the local production or retention of sulfocyanate.

Metabolic Data.

1. *First fasting experiment.* Initial weight of dog, 8.46 kilos. "Fore" period on standard diet, 4 days. Fasting period, with water *ad lib.*, 7 days.†

2. *Second fasting experiment.* Initial weight of dog, 6.7 kilos. "Fore" period on standard diet, 4 days. Fasting period, with water *ad lib.*, 6 days. The daily record is appended (Table II).

3. *Overfeeding experiment.* Initial weight of dog, 4.85 kilos. "Fore" period on standard diet, 3 days. Period of overfeeding, 7 days. The daily record is appended (Table III).

The analytic data for the tissues from the dogs in these three experiments are summarized in Table IV.

The sulfocyanate data for the fasting and overfeeding experiments do not give positive support to our theory that sulfocyanate results from protein metabolism. The production of sulfocyanate, as indicated by its *excretion,* was perceptibly decreased during fasting, but was increased very slightly if at all during overfeeding with protein. If, however, the production of sulfocyanate is estimated from the data for its *distribution,* the figures indicate that it was not materially affected by either fasting or overfeeding. (Compare the figures "per 100," in Table IV with those in Table I.) Although the *total* metabolism decreases toward the vanishing point during fasting, *protein* metabolism proceeds actively so long as life continues. Possibly sulfocyanate normally

TABLE II. DATA PERTAINING TO THE SECOND FASTING EXPERIMENT.

Day. No.	Condition.	Urine. Vol.	Urine. KSCN.* Total.	Urine. KSCN.* Per day.	Feces. Weight dry.	Feces. KSCN.* Total.	Feces. KSCN.* Per day.
		cc.	mg.	mg.	gm.	mg.	mg.
1	Fed	230	5.75	2.88	42	2.70	1.35
2	"	255			40		
3	"	225	6.10	3.05	38	3.24	1.62
4	"	240			43		
5	Fasted	80			10	......	......
6	"	50	3.90	1.30	0		
7	"	45			0	(Intestinal	
8	"	70			0	contents),	1.27
9	"	45	3.55	1.18	0	6.35	
10	"	48			0		

* *Total* sulfocyanate is expressed as *potassium* sulfocyanate.

1902, xxxv, p. 2191. Thiel: *ibid.*, p. 2766. Edinger and Clemens: *Zeitschrift für klinische Medizin,* 1906, lix, p. 223. Kahn and Gies: DENTAL COSMOS, 1913, lv, p. 43.

† The first experiment was conducted a year ago with special reference to the proportions of sulfocyanate *in the tissues.* The data for urine and feces were not noted in a *daily* record, such as appears here for the other two experiments of this series.

results wholly from *endogenous protein changes* that are not materially affected by the *amount* of ingested protein.† The quantity of —CN-production in normal metabolism is very slight at best, and probably only a *few* nitrogen-containing radicals in *certain* proteins are involved.

If the metabolism of protein, *as protein,* were the essential factor in the yield of sulfocyanate, our results in this connection would dispute our theory;

TABLE III. DATA PERTAINING TO THE OVERFEEDING EXPERIMENT.

Day. No.	Weight of meat in food (per kilo. of body weight).	Urine.			Feces.		
		Vol.	KSCN.* Total.	KSCN.* Per day	Weight dry.	KSCN.* Total.	KSCN.* Per day.
	gm.	cc.	mg.	mg.	gm.	mg.	mg.
1	15	170			18		
2	15	155	6.77	2.35	18	3.17	1.06
3	15	160			22		
4	30	170	4.90	2.45	33	4.20	2.10
5	35	140			50		
6	40	134	4.85	2.43	57	Lost	. . . . . .
7	45	190			55		
8	50	230			60		
9	60	225	7.95	2.65	75	5.50	1.83
10	65	245			64		

* *Total* sulfocyanate is expressed as *potassium* sulfocyanate.

TABLE IV. DATA PERTAINING TO TISSUES FROM THE DOGS OF THE 3 NUTRITION EXPERIMENTS.

Parts.	Experiment. Fasting (1).			Fasting (2).			Overfeeding.		
	Weight.	KSCN.* Total.	KSCN.* Per 100 grams.	Weight.	KSCN.* Total.	KSCN.* Per 100 grams.	Weight.	KSCN.* Total.	KSCN.* Per 100 grams.
	gm.	mg.	mg.	gm.	mg.	mg.	gm.	mg.	mg.
Bile	19	4.7	24.8	12	2.05	17.1	39	6.75	17.3
Blood	455	15.3	3.4	292	17.2	5.9	340	19.9	5.9
Brain	55	0	0	. . .	. . .	. . .	. . .	. . .	. . .
Heart	60	0	0	. . .	. . .	. . .	. . .	. . .	. . .
Intestine (large) . . .	50	0	0	35	6.35	4.3	72	15.4	5.8
Intestine (small) . .	180	0	0	112			195		
Kidneys	45	0	0	49	0	0	43	0	0
Liver	180	12.4	6.9	156	14.7	9.4	227	16.7	7.4
Pancreas and spleen. .	32	0	0	37	0	0	45	0	0
Stomach contents . . .	85	0	0	42	0	0	117	Lost	. . .

* *Total* sulfocyanate is expressed as *potassium* sulfocyanate.

† Sulfocyanate may be similar to creatinin in this respect. Although creatinin is evidently derived from protein or protein decomposition products, the amount of creatinin in the urine is independent of the quantity of *protein* in the diet, and is excreted by the

but, since the normal yield of sulfocyanate appears to depend mainly on the production or evolution of —CN radicals from *parts* of proteins (intracellular?), and since the availability of such —CN radicals must depend on the *nature* of the proteins concerned, as well as on the character and extent of their metabolic *disintegration*, the above negative findings are seen in their true significance.*

The amino-acids derived from the proteins in a given mass of food are also probably so well *balanced* to meet the assimilation needs of the organism, that sulfocyanate may fail to arise from any of them to any marked degree because there are no surplus radicals of the proper kind for such an outcome. On the other hand, the administration of a fairly large quantity of a *single* amino-acid, *e.g.* glycocol, that is capable of yielding —CN radicals (Table I) may, because of its redundancy and consequent nutritional uselessness, easily pass, in part, into the sulfocyanate channel of production and excretion. This particular phase of the subject requires further investigation.

IV. On the "Anatomical" Origin of Sulfocyanate.

A year ago we said:

> Our experimental data on the origin of sulfocyanate suggest strongly that sulfocyanate results from the metabolism of protein, *that the liver is the organ chiefly concerned in the production of sulfocyanate,* and that the salivary glands *excrete rather than secrete* sulfocyanate in saliva (page 49). . . . The chemical defenses of the organism are presumably just as effectively operative in this connection as in any other. The liver combines the $—HSO_3$ radical with putrefactive indol from the intestine (after oxidizing the indol to indoxyl), thus converting the toxic indol into a much less toxic substance (indican) prior to its elimination in the urine and in other excretions. In like manner (our data suggest) the toxic —CN-products of metabolism, or of extraneous introductions, are suitably modified and combined, in part at least, with freely available, normally occurrent —SH radicals, *apparently in the liver,* into much less toxic sulfocyanate prior to elimination of the latter in the urine and in other excretions. (Page 49.)

These conclusions, involving the liver as the organ *chiefly* concerned in the production of sulfocyanate, were based on the comparatively large proportions of sulfocyanate in the liver and bile of exsanguinated dogs; on the prominent activity of the liver in protein and sulfur metabolism, as shown especially by the utilization in the liver of cystin and sulfate in the production of taurocholic acid, indican, etc.; and on the important part the liver plays in detoxifications in general.

We have recently sought to overthrow this general conclusion, if ill-founded, by raising and attempting to answer the following specific and very pertinent question in this connection: Would the proportion of sulfocyanate in blood from a given animal be increased, if some of that blood were passed repeatedly through the surviving liver of the same animal? We tested this matter in five experiments in the following direct way.

Dogs that were well nourished on our standard laboratory diet were bled to death, in each case from a femoral artery, under local anesthesia. The animal, reclining on its back during the bleeding and subsequent procedure, was kept covered with rubber cloth; and a warm-water bag under the dog aided further in retarding the rate of fall of

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kidneys very constantly, hour by hour and day by day, in a given normal individual. Even during fasting, for periods of the length selected for the above-mentioned experiments, the decrease in creatinin excretion is comparatively slight. This general agreement in behavior, and the fact that the ingestion of creatinin is followed by an increased output of sulfocyanate, may be a significant correspondence. The senior author intends to give this matter experimental attention in the near future, especially the questions pertaining to the endogenous production of sulfocyanate.

* If sulfocyanate were characteristic of saliva, endogenous production of sulfocyanate might be ascribed to the salivary glands. In dogs both saliva and salivary glands are free from sulfocyanate.

body temperature. In each experiment the blood was directed from the cannula through a rubber tube into a bottle completely covered with a rubber membrane, into which a protruding glass stirring-rod was fastened. The blood was promptly defibrinated with the rod, the rubber covering (which fitted tightly over the bottle and against the rod) preventing evaporation. The temperature of the defibrinated blood was kept at 37° C. until the animal could be prepared for the perfusions—a few minutes after the defibrination of the blood. buret. The blood, kept continuously as near 37° C. as possible, was passed through the liver repeatedly (4–14 times). During the periods of collection, the blood was kept in closed bottles, so that evaporation was reduced to a minimum. Samples of the defibrinated blood as it was first obtained, and after various excursions through the liver, were analyzed for sulfocyanate by the Rupp, Schied, and Thiel method already referred to. The essential data are summarized in Table V.

TABLE V. DATA PERTAINING TO THE LIVER-BLOOD PERFUSION EXPERIMENTS.

(Sulfocyanate content in the blood is expressed as milligrams of KSCN per 100 cc.)

Perfusion trip.	Experiments.				
	1	2	3	4	5
0 (Control)	3.70	*	3.25	5.20	† 4.15
1	. . . .	4.14	. . . .	. . . .	. . . .
3	4.15	6.72	5.30	8.75	8.90
6	**4.73**	. . . .	5.70	**9.62**	**9.27**
7	. . . .	. . . .	. . . .	. . . .	. . . .
8	. . . .	**6.91**	. . . .	. . . .	. . . .
9	. . . .	. . . .	. . . . .	9.50	. . . . . .
10	. . . .	. . . .	**5.94**	. . . . . .	9.13
14	. . . .	. . . .	. . . . . .	. . . . . .	9.25
Liver (—SCN expressed as KSCN *per 100 gm.*)‡	5.57	11.70	8.18	9.78	9.79
Weight of liver (gm.)	372	405	657	483	485

* Sampling of the original supply of defibrinated blood was overlooked.

† Before perfusion, the blood received an addition of 1 cc. of 1 per cent. (vol.) solution of acetonitril per 100 cc. (0.01 per cent. of acetonitril in the blood used).

‡ Blood was expressed from the liver as thoroughly as possible by hand before the tissue was subjected to analysis.

Immediately after the death of the animal, the liver was exposed, cannulas quickly inserted into the portal vein and inferior vena cava, and all other blood-vessels connecting with the liver, outside of this circuit, were closed at once with a general ligature, and the warm blood was promptly perfused rapidly through the liver *in situ*. Perfusion was accomplished by gravity from an elevated

The following exceptions may be noted in the routine described above: In experiment 1 the liver was surrounded with warm physiological salt solution. After the blood became *very* dark, a result of repeated perfusion, its aëration was quickly accomplished, in experiments 3–5 by pouring it back and forth quickly from one bottle to another. The ensuing loss by evaporation must

have been comparatively slight. The blood tended to re-clot, after several excursions, in experiments 1 and 5. When this occurred, thorough defibrination of the whole volume was effected promptly and perfusion was resumed at once. In experiments 1–3 the liver was very turgid at the end of the experiment; especially so in experiment 3. Our operations were not as rapid in the first three experiments as we made them in experiments 4 and 5; the temperature of the liver was not only lower than normal at the beginning of the perfusions, but there was more time for clotting in the hepatic capillaries. In experiment 5 the blood was perfused, at comparatively great speed, with the aid of a large syringe.

It is very obvious, as one inspects the data in Table V, that the blood acquired an increased content of sulfocyanate with each successive perfusion, so long, apparently, as the hepatic cells retained their transforming activity. *That the increases in proportion of sulfocyanate were not due to concentration of the blood* by evaporation or by withdrawal of water in other ways, chemical or mechanical, is shown by the fact that although all such tendencies would assuredly have been cumulative to the end of each of these experiments, the values for content of sulfocyanate did not increase appreciably during the second half of any of the experiments. It is also apparent that the liver itself, in each case, tended to acquire a supernormal content of sulfocyanate, probably because of impairments of the power of excretion from the individual hepatic cells. (Compare the results in Table V with the "normal" figures "per 100" in Table I.)

The increase in sulfocyanate content in the blood was particularly marked as a result of the presence of acetonitril (experiment 5), presumably because of the conversion of the latter, in part at least, into sulfocyanate.

These results fortify our conclusion that the liver is an active factor in the production of sulfocyanate and that such production occurs, under hepatic influences, at the expense of —CN radicals.

We hope to conduct additional experiments by this particular method, especially with blood containing other —CN carriers, also —SH-yielders, and mixtures of some of each, although we can hardly expect to derive, from such an extension of the work, anything beyond an addition of details to the principle already established by the results in Table V.

In this connection we recall the fact that Pascheles* sought to determine the seat of the conversion, in the body, of cyanid into sulfocyanate. To this end, he "digested" both surviving and dead muscle, and liver, with small proportions of sodium cyanid. He found that although sulfocyanate was produced in each mixture (10–30 per cent. conversion), *the liver was more active in this respect than muscle.* The change was found to occur at a temperature as low as 0° C., though very much more slowly than at the temperature of the body.

In work with *pure* sodium sulfocyanate (Kahlbaum preparation), Pollak† found, as we noted before, that sulfocyanate was excreted almost wholly in the urine within four to nine days after the introduction of relatively very large doses in five dogs, one rabbit, and one man. This work, by improved methods, explains and corrects the contrary findings of Bruylants, Lang, and others. Pollak inquired whether *surviving liver* had the power to *destroy* sulfocyanate, but his experiments answered the question in the negative—a fact in general harmony with our own finding that sulfocyanate is *made in the liver.*

Some years ago, in a study of the thyroid, with special reference to its detoxifying power, Hunt‡ selected acetonitril as the "indicator." He found that the ingestion of thyroid by mice diminished their susceptibility (increased their resistance) to acetonitril. Hunt said, in discussing this result

* Pascheles: *Archiv für exper. Pathologie und Pharmakologie*, 1894, xxxiv, p. 281.

† Pollak: *Beiträge zur chem. Physiologie und Pathologie*, 1902, ii, p. 430.

‡ Hunt: *Journal of Biological Chemistry*, 1905, i, p. 33.

(page 43): "It is *possible* that the administration of thyroid so alters the metabolism that more sulfur (by which cyanogen compounds *are normally neutralized in the body*) is made available. . . . A number of writers have pointed out an important relationship between the thyroid and proteins. Thyroidectomized animals, for example, succumb very quickly when put upon a meat diet." Possibly this is due, in part, to a loss in power to detoxify (convert) —CN into —SCN radicals.

Later Hunt published the following conclusions in this connection:*

> Guinea-pigs upon a limited diet excrete a smaller percentage of the cyanogen of acetonitril *as sulfocyanate* than do those upon an unrestricted diet. . . . Certain diets, notably glucose, oatmeal, *liver* and *kidney*, greatly *increase the resistance of mice to acetonitril;* their effect is similar in this respect to the administration of thyroid. . . . . Certain diets (notably eggs, milk, cheese, and various fats) greatly *lower the resistance* of certain animals to acetonitril; their effect is the opposite of that of thyroid. Several glands (notably prostate, ovaries, and testes) have an effect upon the resistance of animals to poisons similar to but *much less marked than that of thyroid.* Other glands (thymus, parathyroid, suprarenals) have either no effect or an effect opposite to that of thyroid (page 89). From these experiments and considerations it seems very probable that it is possible to influence in a specific manner, by diet, one of the most important hormones in the body (page 73).

In a more recent publication on the effect of diet upon the resistance of mice to acetonitril, Hunt† wrote as follows:

> The high degree of resistance of mice to acetonitril caused by certain diets is due in part to the activity of the thyroid gland (page 1032). Although it is possible that the effects differ in different classes of animals, it would be interesting to determine if, in cases of hypothyroidism, the administration of oatmeal and *liver*, for example, would have a favorable influence, and if the withholding of them from patients with hyperthyroidism would be found advantageous. . . . While my experiments show that the effect of oatmeal and *liver* is in part due to an effect on the thyroid, they show equally plainly that other factors are involved (page 1033).*

These findings are very significant for the student of the biological origin of sulfocyanate. They suggest that variations in diet affect the production of sulfocyanate, directly as well as indirectly: directly, by varying the gross *supply* of —CN- and —SH-yielding substances (exogenous); indirectly, by so influencing the thyroid and probably other organs whose hormones may control metabolism in the cells of the liver, and other parts, as to increase or decrease *endogenous tendencies* to (detoxifying, protective) sulfocyanate synthesis.

The following comment by Gamgee is very suggestive in this connection:†

> Fenwick,‡ who has paid much attention to the variation in the amount of sulfocyanic acid in the saliva, believes that the salt is a product, and so indirectly affords evidence of the nitrogenous metabolism of the organism, and that its amount diminishes, under conditions in which the activity of the nutritive functions is diminished. He considers, though on evidence which is indirect and unsatisfactory, that the sulfocyanic acid of the saliva is genetically related to the organic sulfur compound of the bile—an opinion which he bases especially on the statement that whenever the bile is prevented from reaching the alimentary canal, the sulfocyanate of the saliva disappears. It appears desirable that the statement of Fenwick should be controlled by observations on animals in which biliary fistulæ have been successfully established.

The senior author intends not only to test the concluding suggestion in the foregoing quotation, but also to determine the effects on the excretion of sul-

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* Hunt: *Bulletin No. 69, Hygienic Laboratory, U. S. Public Health and Marine-Hospital Service*, 1910, p. 89.

† Hunt: *Journ. Amer. Med. Association*, 1911, lvii, p. 1032.

* See also Trendelenberg: *Biochemische Zeitschrift*, 1910, xxix, p. 396. Lussky: *Amer. Journal of Physiology*, 1912, xxx, p. 63.

† Gamgee: "Text-book of the Physiological Chemistry of the Animal Body," 1893, ii, p. 20.

‡ Fenwick: "The Saliva as a Test for Functional Disorders of the Liver." London, 1889.

focyanate of feeding *liver* and administering *bile*, bile salts, and bile extracts.

V. Is Sulfocyanate Produced in the Salivary Glands?

The presence of sulfocyanate in the saliva of man does not necessarily imply that human salivary glands *produce* sulfocyanate.

Schneider* has reported the exceptional case of a young man whose saliva, though frequently tested, was found to be free from sulfocyanate. "After an interval of a year the sulfocyanate reaction was still absent in this individual, and its presence in his saliva could only be demonstrated by concentrating large quantities of the fluid."

Sulfocyanate is a constituent of the secretions, in man, which bathe the conjunctiva and the nasal mucosa.† Just how much sulfocyanate that is often attributed to human "saliva," originates in the nasal mucosa and is concentrated on the mucosa before admixture of some of its secretion with the oral fluids, has not been determined. *Clinical* records on the content of sulfocyanate in saliva, which do not present definite information on this point, are of little value.

The uniform absence of sulfocyanate from dog saliva shows that sulfocyanate is not ordinarily produced in detectable proportions, if at all, in canine salivary glands. It is highly probable that the salivary glands in other species of animals fail to *produce* sulfocyanate.

Although sulfocyanate is not produced in the salivary glands of dogs, it is *excreted* by these glands after its administration to dogs. Pollak,‡ in accord with other observers, was unable to detect sulfocyanate in dog saliva and in salivary and pancreatic glands of dogs (in the case of the glands both before and after autolytic disintegration). He observed, however, that after the subcutaneous injection of sulfocyanate, some of the substance appeared in the saliva—2.5 mg. of sulfocyanate (expressed as NaSCN) were found in 68 cc. of saliva collected within eight hours after such an introduction of 415 mg. of sodium sulfocyanate. Pollak quotes Edinger and Treupel to the same general effect.

We also found that sulfocyanate, after *intravenous* injection of comparatively large doses into anesthetized dogs, appeared promptly in saliva collected through a cannula, the saliva obtained before the injection having been free from sulfocyanate.

It is well known that administration of a small amount of sulfocyanate to a man is promptly followed by increases in the amounts of sulfocyanate in his saliva and urine.

If sulfocyanate is *secreted* by the human salivary glands, if any real utility in the mouth can be ascribed to salivary sulfocyanate, it might be expected that there would be definite relationships between glandular activity and sulfocyanate production; but, instead of definite relationships, all available records emphasize the utter lack of any such uniformity. If sulfocyanate is not merely *excreted* from the salivary glands in accord with the influence of a prevailing surplus of that substance in the blood, but instead is produced independently in the salivary glands by a true *secretory* process, it might be fairly assumed that the proportion of sulfocyanate in saliva would increase rather than decrease as a result of secretory *stimulation*. Yet the opposite is the case. Thus, Schneider found that "The excretion of sulfocyanate may be considerably diminished by prolonged stimulation of the salivary glands. For example, in one case when the flow of saliva was continuously provoked by chewing a piece of soft paraffin for three hours it diminished . . . from 0.004 per cent. at 8.15 A.M. to 0.002 per cent. at 11 A.M. (expressed as KSCN). . . . This observation was frequently confirmed in other cases. No constant relationship between the content of sulfocyanate and the composition of the

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* Schneider: *Amer. Journal of Physiology*, 1901, v, p. 276.

† Muck: *Münchener med. Wochenschrift*, 1900, xlvii, p. 1168.

‡ Pollak: *Biochemische Zeitschrift*, 1902, ii, p. 432.

saliva (organic matter, ash) could be ascertained in a series of estimations made with this point in view."*

These and many similar observations indicate, plainly enough, that although sulfocyanate is not *secreted,* it can be abundantly *excreted,* by the salivary glands in dogs (and similar animals?). The data also suggest that sulfocyanate is not *produced* in the salivary glands, in man, that it is merely *excreted* by the salivary glands, human blood containing sufficient sulfocyanate, presumably, to induce such excretion fairly continuously in addition to that which occurs in the urine and through other channels. But these observations and opinions, together with the fact that sulfocyanate cannot bear any relation to the truth conveyed by the phrase, "clean as a hound's tooth," *fail to suggest a protective influence of salivary sulfocyanate on the teeth.* If we *must* persist in trying to find such a relationship, isn't it about time for us to swing to the other extreme, and begin to assume the *worst*—that sulfocyanate may be *detrimental* to the teeth? This appears to us to be quite as logical and probable, *from the facts at hand,* as the inference that sulfocyanate is *beneficial*—which is not saying anything convincing, we admit!

VI. On the Pharmacology of Sodium Sulfocyanate.

In our report a year ago, we said:

Earnest students of the problem of dental caries, who entered this field long before we did and whose desire to explain and prevent the disease is quite as sincere as ours, believe the results of their work indicate that the internal administration of sulfocyanate is preventive, alleviative, and curative of dental caries. They attribute the therapeutic value of sulfocyanate to the smaller portion of the administered substance which reappears in the saliva, and seemingly ignore the influence and fate of the larger portion of the dose which does not pass into the saliva. *In spite of the fact that the pharmacology of sulfocyanate has not been effectively studied,* some dentists recommend the internal administration of comparatively large doses of sulfocyanate and have been administering such doses *without any apparent regard for effects, good or bad, that may be registered on any other part of the body than the teeth.* If it were impossible to ascertain the pharmacologic effects of sulfocyanate, this empirical treatment might be excusable, but the present concentration of attention on the effects of sulfocyanate on the teeth and the disregard for systemic influences it may exercise, is contrary to the spirit of modern medicine and a reflection on the practice of dentistry.

I say this without reference to the ultimate outcome of investigation of this matter. I cannot declare that the internal administration of sulfocyanate in certain doses is without therapeutic advantage—that such doses do not possess curative or palliative effects in dental caries—for I do not know. I cannot say that such doses, if valuable in dental caries, are appreciably harmful in other respects—for I do not know this either. I wish merely to insist that *our profound ignorance of the pharmacology of sulfocyanate should prevent us from proceeding empirically in its therapeutic use without due regard for considerations more immediately important, possibly, than those of preventing or curing or alleviating dental caries by such dubious means.* (Page 51.)

It was also said in that report:

Your society has given considerable attention to sulfocyanate, chiefly from the standpoint of the possibility that salivary sulfocyanate prevents, inhibits, retards, or delays the onset and progress of dental caries. If salivary sulfocyanate is an *excretory* product, as I have suggested, such a prophylactic relation to dental caries is improbable. The available experimental data on the subject of an inhibitory influence of sulfocyanate on plaque formation are not only discordant, but cannot be applied satisfactorily to oral conditions. No *rational* explanation has been offered for the supposed effects of sulfocyanate, in salivary proportions, on the formation of bacterial plaques or on bacterial growth or activity. Our studies under your

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* Schneider: *Amer. Journal of Physiology,* 1901, v, p. 278. Such results as these might suggest, of course, that the glands became exhausted and on that account weakened, temporarily, in their power to secrete sulfocyanate. The results might also imply that the secretion of water was especially increased as the stimulation continued. But neither of these assumptions strengthens the prophylactic argument in behalf of salivary sulfocyanate.

auspices* have convinced me that sulfocyanate does not, and, in the proportions of its occurrence in saliva, *cannot* appreciably retard the growth of oral bacteria, or impair their nutrition, or reduce their capacity to produce acid from carbohydrate. I believe that the ease with which sulfocyanate may be detected in the saliva, and the striking and attractive nature of the test, have given sulfocyanate an importance it does not deserve. (Page 50.)

In our report a year ago, as has just been said, we expressed the belief that the reported therapeutic use of sulfocyanate *had not been warranted by definite knowledge of its effects* and that its actual medicinal employment had been without influence on dental caries. Nevertheless, the earnest argument, by a former research committee of your society and by a number of dentists, in behalf of the therapeutic use of sulfocyanate (largely on the basis of "results"), led us to propose an extension of our preliminary toxicological study to observations on the *pharmacology* of sulfocyanate.†

In concluding our reference to this matter a year ago, we said:

Our results strongly suggest an extension of this work along the several lines I have indicated. They emphasize especially the need for thorough determinations of the hidden effects of doses of sulfocyanate that produce no gross toxic symptoms—doses given to mammals, and particularly to men who would volunteer to submit to such treatment, after its possible dangers were clearly and fairly indicated. (Page 53.)

We have been conducting such a study, which, we regret to say, has not been completed in all its projected parts. Thus far, however, our results warrant the following general conclusions:

(1) *Therapeutic* doses of sodium sulfocyanate (in cats and dogs under anesthesia) were practically without effect on respiration, heart-rate, blood pressure, secretion of saliva, secretion of bile, and excretion of urine.

(2) Daily *therapeutic* doses of sodium sulfocyanate (in three men under daily observation for from two to three weeks at a time in each case) induced no unfavorable effects on heart-rate or blood pressure.

(3) The sulfocyanates of sodium and potassium, in therapeutic proportions, exerted no appreciable systemic action. The observed toxicity of the potassium salt in such doses was due solely to the potassium ion.

All the pharmacological experiments on which these three general conclusions are based were performed by Professor Lieb in the pharmacological laboratory of Columbia University, at the College of Physicians and Surgeons, by the best pharmacological methods and with apparatus of the most delicate kind. The speaker repeatedly witnessed the procedures, co-operated in some of the tests, and was one of the subjects in the experiments on men.

All estimations of the effects of sulfocyanate were preceded by preliminary periods of corresponding observation for the establishment of "normal" or "control" values.

Condensed memoranda of these pharmacological experiments are substituted below for the more detailed statements in the speaker's oral report at Albany. The details of the experiments, which would carry this long report beyond a reasonable extension, will be published in one of the pharmacological journals in the near future, and a synopsis of that paper will be offered to the DENTAL COSMOS for the convenience of the readers of this report.

(A) Experiments on Animals.

1. *Blood pressure.* Blood pressure was recorded by a mercury manometer connected with the carotid artery. The salt solutions were of the same freezing-point as the blood and were injected intravenously.

* Seaman and Gies: DENTAL COSMOS, 1910, lii, p. 1141.

† The *details* of the toxicological work to which we referred, generally, in our report a year ago were published by Kahn: Dissertation (Ph.D., Columbia University, 1912), pp. 83 (May 18th).

Cats were anesthetized with either Hanzlik's anesthetic, Grehant's anesthetic, or ether. KSCN, 10 mg. per kilo, produced an initial fall in blood pressure followed by prompt compensation. This change was comparable to that following the intravenous injection of a corresponding amount of KCl. NaSCN, 10 mg. per kilo, produced a very slight initial fall in pressure, followed by a more than compensatory rise, which was maintained for from three to five minutes. *Toxicity:* Increasing doses of NaSCN up to 360 mg. per kilo, within an hour, were non-toxic to the circulation. About 100 mg. of KSCN, or of 77 mg. of KCl, per kilo, caused death from cardiac paralysis.

Dogs were anesthetized with morphine and chloretone. KSCN produced no effect in doses less than 4 mg. per kilo. After a larger dose there was an initial fall in blood pressure followed by a compensatory rise, with return to normal within a few minutes. Similar effects resulted from the injection of corresponding amounts of an equimolecular solution of KCl. NaSCN, in doses greater than 10 mg. per kilo, produced an initial fall in blood pressure followed by a compensatory rise, with return to normal within a few minutes. *Toxicity:* A single injection of 100 mg. per kilo produced changes that were no more marked than those following an injection of 20 mg.

2. *Heart-rate.* During the initial fall in blood pressure, in the experiments referred to in the foregoing memoranda, the heart-rate was increased, to be slowed during the secondary rise, returning to normal with the blood pressure. This change in rate is present after the administration of atropin, and is probably secondary to the changes in blood pressure.

3. *Myocardiogram* (1, 2, above). KSCN: The changes following the injection of KSCN resembled those produced by KCl. NaSCN: After the injection of NaSCN, the changes followed the blood pressure, the excursions being greatest during the fall in blood pressure. The administration of daily doses of 100 mg. per kilo for six days did not affect in any way the circulatory response to KSCN or NaSCN.

4. *Turtle heart.* KSCN: On the turtle heart, a few drops of an isotonic KSCN solution produced changes that duplicated those produced by an equimolecular solution of KCl. NaSCN: No effect.

5. *Arteries* (ox). On isolated coronary and carotid arteries, KSCN, in solutions varying in concentration from 14 to 142 in 50,000, produced slight relaxation followed by secondary constriction, which became more marked when the drug was replaced by Ringer solution.

6. *Isolated intestine* (rabbit). KSCN (1:1000 in Ringer solution) caused an increase in tonus, such as followed treatment with KCl. NaSCN had practically no effect on rate of contraction or on tonus.

7. *Central nervous system* (frog). On the central nervous system of frogs, in doses of from 0.125 mg. to 1.5 mg. per gram. of frog, NaSCN or KSCN produced convulsions of the strychnine type. The initially increased reflex excitability was followed by paralysis of the central nervous system (see *Biochemical Bulletin,* 1913, ii, p. 459).

8. *Excretion of urine* (dog: 1–3). The excretion of urine varied directly with the changes in the blood pressure. The observed small total increase of urine also followed the injection of an equal quantity of another salt in equimolecular solution, and was due solely to the "salt action."

9. *Secretion of saliva* (dog). Neither NaSCN nor KSCN, in doses of 10–100 mg. per kilo, had any effect on the rate of salivary secretion.

10. *Respiration* (cat and dog: 1–3, 8, 9). Neither the rate nor the depth of respiration was changed in the slightest degree.

11. *Elimination of* R—SCN. Within a very few minutes after intravenous injection of sulfocyanate, the substance could be recognized in the saliva, and its *increased* output in bile and urine detected. In one experiment the quantity of sulfocyanate in the bile increased 100 per cent. within a few minutes after the injection—a fact in striking accord with

Chart 1. Effect of NaSCN on Blood Pressure.

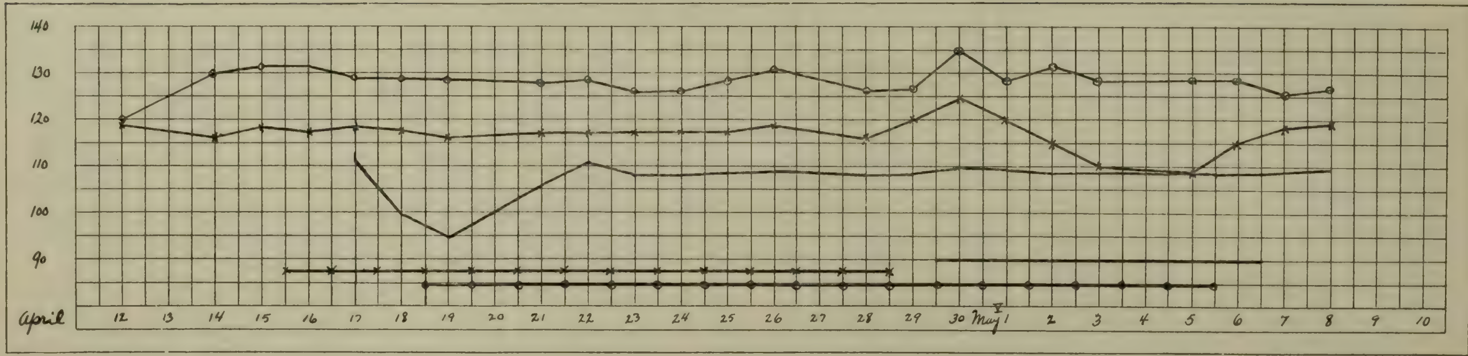
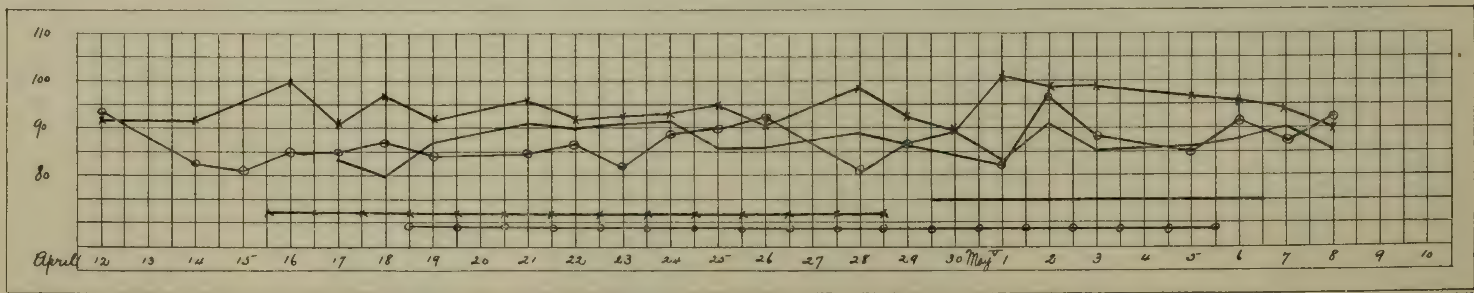


Chart 2. Effect of NaSCN on Heart-rate.



Subjects: —— W. J. G. —×—×— E. G. M. —o—o— A. K.

Straight heavy lines indicate the days of dosage.

our conclusion that the liver excretes sulfocyanate.

(B) Experiments on Men.

12. *Blood pressure.* The usual precautions were taken *to prevent the modifying influence of cerebral excitement, and of all other controllable extraneous factors.*

13. William J. Gies (first test). NaSCN: 35 mg. (½ grain) taken daily, immediately after breakfast, for seven days. Blood pressure was recorded about two hours after the ingestion of the drug (April 17th–May 8th). An ordinary cold, attended with diarrhea, from April 17th to 21st, were the only evidences of abnormality during the experiment. (May 2d was a very warm day. See the accompanying charts.)

Control period (12 days): Blood pressure between 106 and 112 (average 108). NaSCN period (7 days): Blood pressure between 106 and 112 (average 108). "After" period (2 days): Blood pressure between 106 and 110 (average 109).

14. William J. Gies (second test). KSCN, first period; 150 mg. (2½ grains) taken daily, immediately after luncheon, for five days. Then, on the eighth day (second period), one dose of 200 mg. (3 grains) was taken. Blood pressure was recorded about four hours after the ingestion of the drug. (August 11th–18th.)

Control period (2 days): Blood pressure between 106 and 110 (average 108). KSCN, first period (5 days): Blood pressure between 106 and 114 (average 108). KSCN, second period (1 day): Blood pressure 106.

15. Arthur Knudson. NaSCN: ½ grain combined with 2 grains of hydrastis (Dr. F. W. Low's sulfocyanate-hydrastis tablets), were taken each night for two weeks. Blood-pressure was recorded at 2 P.M. (April 12th–May 7th).

Control period (6 days): Blood pressure between 120 and 132 (average 128). NaSCN period (17 days): Blood pressure between 126 and 135 (average 127). "After" period (3 days): Blood pressure between 124 and 128 (average 127).

16. Edgar G. Miller, Jr. NaSCN; ½ grain combined with 2 grains of hydrastis (Dr. F. W. Low's sulfocyanate-hydrastis tablets), were taken daily after breakfast for eleven days. Blood pressure was recorded at 2.30 P.M. (April 12th–May 7th).

Control period (3 days): Blood pressure between 115 and 120 (average 118). NaSCN period (13 days): Blood pressure between 116 and 120 (average 118). "After" period (9 days): Blood pressure between 108 and 120 (average 116). (The low blood pressure occurred on days during which the patient suffered from tonsillitis.)

17 *Heart-rate.* William J. Gies (13) (first test). NaSCN: 35 mg. (½ grain) taken daily immediately after breakfast for seven days. Heart-rate was recorded about two hours after the ingestion of the drug (April 17th–May 8th).

Control period (12 days): Heart-rate varied between 86 and 98 (average 86). NaSCN period (7 days): Heart-rate varied between 82 and 98 (average 86). "After" period (2 days): Heart-rate varied between 84 and 92 (average 88). (The rates above 92 were preceded, in each instance, by rapid walking back and forth in the laboratory due to emergencies that had to be met in this way in spite of plans to the contrary.)

18. William J. Gies (14) (second test). KSCN, first period, 150 mg. (2½ grains) taken daily, immediately after luncheon for five days. Then, on the eighth day (second period), one dose of 200 mg. (3 grains) was taken. Heart-rate recorded about four hours after ingestion of the drug. (Aug. 11th–18th.)

Control period (2 days): Heart-rate varied between 71 and 74 (average 72). KSCN, first period (5 days): Heart-rate varied between 67 and 79 (average 74). KSCN, second period (1 day): Heart-rate varied between 76 and 77 (average 76).

These tests were made late in the afternoons of days which the subject devoted *continuously* to lectures and laboratory work at the close of the summer session at Columbia University, in August 1913. Delay in the publication of this paper made it possible to conduct this special experiment with the

potassium salt, under conditions that were particularly favorable for the elicitation of any serious effects that fairly large doses of sulfocyanate might be able to induce in such tests. It may be safely assumed that, at that time of the year and under the exhausting conditions referred to, the subject would have been specially susceptible to any systemic influences the doses taken might have been able to exercise.

19. Arthur Knudson (15). NaSCN: ½ grain, combined with 2 grains of hydrastis, were taken nightly for two weeks. Heart-rate was recorded at 2 P.M. (April 12th–May 7th).

Control period (6 days): Heart-rate varied between 80 and 94 (average 84). NaSCN period (17 days): Heart-rate varied between 80 and 92 (average 86). "After" period (3 days): Heart-rate varied between 86 and 92 (average 88).

20. Edgar G. Miller, Jr. (16). NaSCN: ½ grain, combined with 2 grains of hydrastis, were taken daily after breakfast for eleven days. Heart-rate was recorded at 2.30 P.M. (April 12th–May 7th).

Control period (3 days): Heart-rate, 92. NaSCN period (13 days): Heart-rate varied between 90 and 100 (average 94). "After" period (9 days): Heart-rate varied between 88 and 94 (average 96).

21. *Opinions expressed by the subjects.* The men involved in these tests (13–20) were unable to detect any subjective symptoms or any systemic effects.

The speaker, himself a subject (13, 14, 17, 18), took each of his doses dissolved in water, and experienced no effects whatever except the unpleasant taste of the more concentrated solutions. In view of the speaker's fear, as expressed a year ago, that such doses might be harmful, his negative personal *experience* is particularly instructive. He couldn't even *imagine* that he felt any general effects! He noted that his saliva, perspiration nasal secretions, and urine gave unusually strong ferric chlorid tests for sulfocyanate during the dosage periods. The sulfocyanate was rapidly excreted. There were no "after-effects," either in systemic symptoms or in responses to the ferric chlorid test for sulfocyanate.

22. *Graphic representation of the "daily average" data.* The accompanying charts (1 and 2), which are self-explanatory, show graphically the generally negative character of the findings.

VII. Summary of General Conclusions.

Sulfocyanate arises in the body from proteins and other substances that yield —CN and —SH radicals. Its quantity in any part of the body appears to depend primarily upon the available metabolic supply of —CN radicals.

The liver appears to be the chief site of sulfocyanate synthesis. The process of production in the liver seems to be essentially one of detoxification (defense) prior to excretion of sulfocyanate in bile and urine, as in the case of the conversion of indol into indican and the urinary elimination of the latter.

The radicals involved in the production of sulfocyanate are evidently of both exogenous and endogenous derivation under ordinary circumstances.

Saliva normally contains excretory substances. Salivary sulfocyanate appears to be wholly excretory in character and significance. After the administration of sulfocyanate it is promptly ejected through all the secretory channels including the salivary glands. Dog saliva, which is normally free from sulfocyanate, contains sulfocyanate in abundance after its systemic introduction, just as human saliva contains excretory alkali-iodid soon after the gastric administration of the latter.

There is nothing about the *known* qualities of sulfocyanate to indicate that sulfocyanate is able, *in the proportions of its normal occurrence in saliva,* to affect the secretory tendencies of the salivary or buccal glands, to modify the oral membranes, to influence the teeth from any standpoint, or to stimulate or retard or alter the activities of the oral micro-organisms. To attribute to sulfocyanate any such power is to do so

empirically and without any present evidence in support of such an opinion.

The proportions of sulfocyanate that normally occur in the blood, lymph, tissues, secretions, and excretions appear to be wholly devoid of toxic or physiological effects.

Doses of sodium sulfocyanate equal to or greater than those which Low and others have recommended, did not cause toxic effects under the conditions of the experiments described in this report. Our results indicate that the doses of sodium sulfocyanate which Low has recommended and used may be taken daily by normal adults, for comparatively long periods, without any danger.*

The speaker's apprehensions in this regard, as stated a year ago, were unjustified, but his caution was warranted.†

We recommend, if you desire to continue the study of sulfocyanate, that you proceed from the *clinical* standpoint. We suggest that the matter be investigated by *practicing dentists* in an effort to determine, by concerted inquiry, whether certain beneficial effects on the teeth, which have been ascribed to sulfocyanate medication, can be confirmed and obtained under conditions both definite and suitable, that would warrant scientific conclusions from the resultant data.

We wish to remind you, in conclusion, of the possibility—of the great probability, in fact—that dental caries, as the speaker* has suggested on various occasions, is not dependent solely upon superficial oral conditions, but is determined to some extent at least by systemic influences. Erdheim† found that when the parathyroids were extirpated from a young rat, its incisor teeth became liable to repeated fracture. Calcification of the dentin ceased at once, more or less completely; the portion already hardened remained unaltered, but as use wore down the older part, the new uncalcified dentin that took its place lacked strength, and fractures followed. *Imperfections in the enamel deposit also occurred,* though at a later period than the alterations in the dentin. By regulating the time between extirpation of the glands and examination of the teeth, all transitional stages between normal teeth and teeth almost completely decalcified could be obtained.‡ Observations of this kind emphasize the need for studies of the relationship of systemic conditions to dental caries, and we recommend the inauguration of such work under your auspices.

We are very greatly indebted to Dr. E. G. Miller, Jr., and Mr. Arthur Knudson, assistants in the Biochemical Laboratory, for their very effective co-operation, as subjects, in the pharmacologic experiments.

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* Shortly after the completion of the pharmacological experiments described in this report we received from Dr. Franz Müller (Charlottenberg) a reprint of a very valuable paper by Dr. Fr. Franz, entitled: "Beitrag zur Frage der Giftigkeit der Rhodanalkalisalze" (*Arbeiten aus dem Kaiserl. Gesundheitsamte,* 1912, xxxviii, p. 435). We are indebted to Dr. Müller for co-operating with us in this manner. Dr. Franz' results led him to the conclusion at which we ourselves have arrived, viz, that small doses of sulfocyanate are devoid of toxicity.

† Kobert ascribed convulsions in, and death of, a woman to a dose of 5 grains (0.3 gm.) of ammonium sulfocyanate ("Lehrbuch der Intoxikationen," 1906, ii, p. 861). Although Kobert's remarks regarding this fatal outcome do not make it certain that death did not result from another cause, his statement required due consideration. This was but one of the many reasons for fear that dosage with sulfocyanate might be harmful. *We do not know that such dosage is harmless in unhealthy people.* Our experiments were conducted upon healthy vigorous individuals.

* Gies: *Journal of the Allied Dental Societies,* 1912, vii, 214.

† Erdheim: *Frankfort Zeitschrift für Pathologie,* 1911, vii, p. 178.

‡ Unavoidable delay in the publication of this report enables us to refer, for more detailed discussion of this matter, to the recent papers by Lothrop and Gies, in the *Journal of the Allied Dental Societies* (1913, viii, p. 323), and Kirk, in the DENTAL COSMOS (1914, lvi, p. 1). The Research Committee has approved our plans for studies of the influence of "*internal* secretions" (secretions from the *ductless glands*) on the quality of the teeth. Work relating especially to the influence of the parathyroids was inaugurated in October, in the Biochemical Laboratory, with the co-operation of Dr. Sergius Morgulis.—W. J. G.

(See also *Discussion,* page 208, this issue.)

THE KINEMATOGRAPH A FUTURE ADJUNCT TO THE TEACHING OF DENTISTRY.

By RICHARD H. RIETHMÜLLER, Ph.D.Univ.Pa., D.D.S., Philadelphia, Pa.,
ASST. DEMONSTRATOR, MEDICO-CHIRURGICAL COLLEGE OF PHILADELPHIA.

WHEN, some twenty years ago, the kinematograph was first publicly shown, it was by many regarded as a mere toy on the order of the zoëtrope, or even more primitive devices. Since then, remarkable progress has been made in the production of motion pictures, millions of capital have been invested in the staging and manufacture of films, and show-houses continue to spring up like mushrooms to satisfy the public demand for this form of entertainment, which has become an annoying rival to the higher order of drama.

THE KINEMATOGRAPH IN PROPAGANDA WORK.

The popularity of the kinematograph had no sooner become an established fact, when shrewd publicity agents as well as farsighted propagandists realized the possibilities of this institution as a medium for giving wide publicity to their endeavors. Thus the moving picture has become an advertising agent for commercial purposes, a "spellbinder" preparing the soil in political elections, a sensational herald of social dangers, and what not. Mining corporations and powder works are instructing their employees in safety methods by lectures illustrated with moving pictures, military and boy-scout organizations are teaching "first aid to the wounded," agricultural and hygiene exhibits are demonstrating their aims, mechanical trades and scientific management schools—all are conveying their lessons by the aid of the kinematograph. Zoölogy has added many new chapters to its volume of information on the habits of animals, and the young science of aviatics has learned its first and most important lessons from moving pictures of birds in flight.

ITS USE IN GENERAL SURGERY.

The feature of greatest promise scientifically of the kinematograph, however, has only recently been pointed out, when it was shown by one advocate of motion studies that the processes of surgery, which require the most delicate of manipulations, may be greatly improved by the adoption of motion-saving and time-saving methods. "From the time unconsciousness begins, until the administration of ether ends, an operation may be roughly divided into three periods, viz, preparation, dissection, and repair. It is found that most of the lost time can be saved out of the first of these periods. Interruptions can be eliminated, motions can be systematized, outfits can be standardized, and above all, the attentions of nurses and assistants can be systematized. While less saving can be made in the second and third periods, much way can be gained by the elimination of wasted motion, with the important result that the 'ether moments' of the patient may be reduced by an estimated amount of from 20 to 30 per cent."

That this application of scientific management is not merely empirical, but scientific as it claims to be, appears from the accurate methods by which the operator's movement are measured: "In the experimental room, the floor and walls are divided into four-inch squares, with red and white alternating, thus providing a background against which

the slightest and quickest movement may be photographed. In a conspicuous position is a clock-face, one and one-half feet in diameter, having a hand that makes one revolution in six seconds. By the use of a kinetoscope, the motions of the person engaged in any kind of work may be measured to the fiftieth part of a second. With this equipment the best way of doing a given operation may be determined by actual accurate measurements."

Dr. Doyen of Paris especially advocates the teaching of surgery by films to students before admitting them to a view of the actual operation, which then becomes much more valuable. He also makes it a point that such a record of his actual work permits a doctor to criticize it and his and his assistants' positions in a way that they could not possibly do otherwise. It is also an infallible record of the correctness and adequacy of the methods employed.

Dr. Doyen advocates the establishment by this means of a great museum of surgical art, which would assemble films of the greatest operators engaged in unique or difficult operations, which otherwise would be lost.

VARIOUS ORAL HYGIENE FILMS.

From the foregoing employment of the kinematograph in anesthesia and surgery, it appears that there really is a wide field for this apparatus in dental teaching. Dentistry has made very good use of moving pictures by making an almost worldwide propaganda for oral hygiene by this means. But the efforts of the Oral Hygiene Committee of the National Dental Association, and those of Mr. George Cunningham, organizer of the Cambridge Dental Institute for Children, mark only the beginnings of the great benefits which dentistry may derive from the moving-picture machine.

SCOPE OF APPLICATION IN DENTAL TEACHING AND CLINICS.

Every dental student and teacher realizes that the methods available at present for the *ad oculos* demonstration of prosthetic or operative procedures are inadequate. This defect is only partly overcome either by dividing a class into many small sections, or by engaging a large staff of demonstrators. In the first case, the operator is hindered in his manipulative skill by the closeness of the observers, of whom, owing to the very delicate and minute nature of the work and the extremely limited field of vision which the human mouth offers, perhaps only two who occupy a point of special advantage or enjoy specially sharp eyesight obtain a really clear view and the full benefit of the demonstration. Dummies, such as are being used in some schools, are at best a poor substitute for the natural intricate field of operation. In the second case, the personal equation plays too much of a rôle, since almost every demonstrator operates differently not only in regard to actual procedure, but in regard to attitude, manner of manipulation, and speed in operating, thus making the much-desired standards in dental teaching extremely variable. Some operations, especially those in the domain of oral surgery, are only partly demonstrable. In an extraction, for instance, the operator invariably occupies the entire field of vision; the manner in which he grips the tooth with his forceps he can only describe by word of mouth, and slowness in operating or repetition of the operative interference is impossible. Thus it happens that every graduate, when entering upon practice, realizes that he must work out his own salvation to the best of his judgment.

How different with the kinematograph! Any number of students may observe with equal clearness and facility a teacher of worldwide reputation and skill go through all the steps of an operation, from the most insignificant to the most complicated. Not only can the field of operation be enlarged in the film so that the most minute details become visible, but the time and energy that can be saved by methodical manipulation can be actually measured, and the operation repeated, until even the dullest student has fully grasped the subject. Thus operative perfection, scientific manage-

ment, and standardization of instruments and methods are at once attained. It is needless to emphasize how much a lecturer's discourse would gain in impressiveness and possibility of visualization, or with what extreme realism surgical procedures, treatments, cavity preparation, and filling operations can be reproduced, from the moment the patient enters the waiting-room until he is ushered out. Incidentally such very important features as equipment of waiting and operating rooms, the assistant's cooperation, manner of preparing the chair, sterilizing instruments, and having these and every other part of the instrumentarium ready for instantaneous use, and innumerable other details, can be realistically depicted, which when merely described leave little or no impression upon the student's mind.

To the classes in prosthetics the process of making an artificial denture or a bridge can be shown in fullest detail, from the taking of the impression in the mouth on through all the successive steps, to the final fitting of the finished product in the mouth. There is, indeed, hardly any subject in the dental curriculum, instruction in which has not benefited from lantern slides, and which could not be rendered infinitely more comprehensible by the kinematograph. In bacteriology, the understanding of bacteria in their movements and functions has been enhanced by motion studies made with the aid of the motion camera and the microscope or ultra-microscope. In physiology a great deal of unnecessary repetition in animal and laboratory experimentation could be avoided, and time and material saved in demonstrating important processes, such as circulation, digestion, respiration, fermentation. In metallurgy, such important yet heretofore undemonstrable phenomena as the crystalline changes which take place during tests for the tensile strength of a piece of metal, can be actually photographed and reproduced by a microscope and moving-picture camera, and, no doubt, the changes that occur in amalgams during the process of setting could be demonstrated in the same way, thereby eradicating a great deal of the crude empiricism rampant in the much-mooted problem of dental amalgams. Just as has been done in medicine, the preparations for and induction of anesthesia, both local and general, and the phases and effects of various anesthetics, can be shown to dental students.

Besides its value as an adjunct to the teaching of dentistry, the kinematograph, in my opinion, is destined to become a very important demonstrating medium at dental meetings, and to make dental clinics, the teaching value of which Dr. W. A. Price* has endeavored to enhance by better means of organization and rotation, really "progressive."

THE QUESTION OF COST.

While no expense should be too great where the dissemination of knowledge and human welfare is concerned, the price of the various films to be made would not be as high as that of an ordinary melodramatic film, and could be shared by several dental schools by means of a system of exchange or circulation. As the *British Journal of Dental Science* (December 1913, p. 822) says editorially: "Notable labor is nowadays put in pictures which from their nature can never achieve popularity, and which stand very little chance of ever figuring in an ordinary program. The time and trouble which —— (mentioning a Paris firm) put into films are enormous, and even if they are not a particularly lucrative feature of the industry, they are, at any rate, of inestimable value to the medical student and to the doctor anxious to keep in touch with the development of science in all parts of the world."

CONCLUSION.

As a valuable adjunct to the teaching of the theory and practice of dental science, as a means for standardization and for the introduction of dental instruments and methods, and as a recorder of dental history, the kine-

* See "The Progressive Dental Clinic," by Weston A. Price, DENTAL COSMOS, July 1913, p. 715.

matograph is bound to render in the future inestimable service, regardless of what may be the ultimate residuum of the present popular *furore* in the matter of the sensational "moving picture" shows.

ARE THE CAPILLARIES OF THE ENAMEL CAPABLE OF SUSTAINING METABOLISM?

By THEO. VON BEUST, D.D.S., M.D., Dresden, Germany.

IN vol. lv, No. 10 (October 1913), of the DENTAL COSMOS, Prof. H. P. Pickerill questions the merit of the conclusions expressed in an article entitled "A Contribution to the Study of Immunity to Dental Caries," which appeared in vol. liv, No. 6 (June 1912) of this journal.

In his highly interesting article, Professor Pickerill exhibits three figures (Figs. 37, 38, and 39) in which the tissues had been stained by my method of capillary attraction. These serve to illustrate the view expressed under "(8)" in the summary of his contribution, which reads: "There is not sufficient evidence to show that normal secretions or bodily juices may pass from the dentin to the enamel."

The photographs shown force me to conclude that Professor Pickerill expected to find a general staining of the tissue of the enamel rods, which alone would result in the diffuse staining which he was evidently expecting and which failed to appear in his preparations. As a matter of fact, the enamel of the specimens prepared in the manner described by me in the above-mentioned article (ground in paraffin oil and mounted in balsam) as a rule appears, when examined macroscopically or when enlarged to the size of the cuts shown by Dr. Pickerill, perfectly white. If sufficiently magnified to disclose the enamel capillaries, however, it will be seen that all the vessels pictured by me in the DENTAL COSMOS have absorbed and transmitted the stain. These findings establish beyond a doubt the existence of a communication between the pulp and the surface of the enamel by way of the dentinal tubes and the canals of the enamel, and lead me to conclude that metabolism is possible, and probable.

In the report cited by Professor Pickerill I made no allusion whatever to a staining of the enamel rods. That they occasionally do stain, as Professor Pickerill declares—and, I may add, very frequently in recently erupted teeth—only serves to substantiate my claim that tissue changes take place in the enamel of the erupted tooth. It was no "very occasional result" upon which I based my ideas. On the contrary, in no instance have I been unsuccessful in finding the enamel capillaries stained, and the number of teeth examined is by no means small. I venture to say that the stain in the enamel vessels in the very specimens exhibited by Professor Pickerill can be demonstrated, provided that they were ground in oil of a neutral reaction.

Professor Pickerill's objection to alcoholic stains, owing to their volatility, is worthy of mention, but it happens to have no practical bearing upon the subject. The enamel capillaries will convey watery stains also. (See *Archiv für Zahnheilkunde* for November 1913.) Too little is known, furthermore, of the relative diffusibility of the protein derivatives and salts entertaining tissue metabolism, as compared to coloring matters, to admit of any conclusions in this regard.

Nitrate of silver will penetrate the

enamel vessels in the manner described by me, about as well as any other stain. Proof: The root of a freshly extracted tooth is sawed through about midway between the apex and the crown, and the root and pulp cavity enlarged to receive the end of a glass funnel or pipet. The surface of the root is superficially ground (up to the enamel line) and the sawed end and ground surface shellacked, care being taken to prevent the varnish from reaching the inner part of the pulp cavity or surface of the crown. The funnel, containing a wire, is now sealed into the tooth with sticky-wax, allowing the wax to spread over the shellacked part of the tooth. After the wax has cooled, a few drops of water are placed into the funnel and the wire withdrawn (to exclude the air!). One per cent. nitrate of silver in aqueous solution is now added and the specimen is placed in the dark. After the lapse of a few days the teeth are ground in paraffin oil, the sections are wiped and placed in a bottle containing dilute alcohol. The bottle is now placed in the sun until decomposition of the salt has taken place, whereupon the specimens are passed through strong and finally through absolute alcohol (to extract the water), washed in xylol, and imbedded in balsam. Microscopical examination discloses the fact that the silver solution has followed the dentinal tubes and permeated all uncalcified tissue of the enamel, *i.e.* the capillary spaces.

The cross section of the enamel fibers displaying the arangement of the capillaries, which Professor Pickerill shows in his Fig. 12 and Fig. 33, resembles my own illustration Fig. 3. These canals are in my opinion identical with the sinuosities to which the name spindles and tufts have been given. They certainly stand in direct communication with the dentinal tubes. My experiments verify the view expressed by Professor Pickerill that these "interprismatic spaces" are continuous, and show, moreover, that all other spaces in the enamel are parts of one great system. That their origination is the result of "imperfectly acquired function," however, I do not believe. These canals are found in all teeth, including the teeth of the anthropoid apes raised in their native habitat. Their occurrence is so general and their morphological uniformity so constant, that anyone about to grind a specimen can as logically expect to find the characteristic appearances produced by the presence of these capillaries, as an accoucheur would expect to find fingers and toes on a babe being born.

Proceedings of Societies.

NATIONAL DENTAL ASSOCIATION.

Seventeenth Annual Meeting, held at Kansas City, Mo., July 8 to 11, 1913.

(Continued from page 90.)

SECTION III: Oral Surgery, Anatomy, Physiology, Histology, Pathology, Etiology, Hygiene, Prophylaxis, Materia Medica, and Allied Subjects.

Chairman—J. P. Buckley, Chicago, Ill.
Vice-chairman—C. V. Vignes, New Orleans, La.
Secretary—Leuman Waugh, Buffalo, N. Y.

The next order of business for Section III was the reading of a paper by Dr. Edgar D. Coolidge, Chicago, Ill., entitled "The Etiology and Progress of Dental Caries."

[This paper is printed in full at page 167 of the present issue of the Cosmos.]

Discussion.

Dr. H. E. Friesell, Pittsburgh, Pa. Dr. Coolidge has presented us with an excellent paper upon a subject which is as old, as common, and as important as it is little understood. The paper covers the subject in a clear, terse manner, and presents the salient points of the varying theories of the most important investigators of dental caries in a way that merits our commendation.

In line with the declaration of the good Book that all men are sinners, and the findings of our statisticians that 98 per cent. of us have carious teeth, perhaps the ancients were not so far wrong in the conclusion that toothache was a penance laid upon us by an offended deity. Certainly the circumstantial evidence in the case is equally as strong as much that has been put forward in support of more recent and no less preposterous theories of caries, such as the worm, the electro-chemical, and the acid saliva theories, the softening and rehardening of enamel, and the variability of nutrition in a substance like enamel.

The speaker's conclusions in regard to dental caries, which are based upon pathological as well as clinical observations, are that caries is a constitutional disease, having dissolution of tooth structure as its most noticeable symptom. Like most diseases, dental caries has a predisposing and an exciting cause. Those familiar with the various writings upon the subject will probably conclude that the predisposing cause is as yet not well understood.

Lowered vitality, debility, overwork, sickness, worry, pregnancy, excessive mental excitement, long-continued nervous strain, overeating, or lack of proper physical exercise—any one of these is sufficient to produce such a disturbance in harmonious functioning as to weaken the individual's resistance to bacterial influence; and thus we have the predisposing cause of dental caries, as well as other diseases. A more general term that may be used to cover all these conditions

is "faulty metabolism." The exciting cause of caries is, without doubt, lactic-acid-forming bacteria. This was first brought to our attention by the writings of Underwood and Milles, later demonstrated beyond cavil by the researches of Miller in caries of dentin, and subsequently substantiated and elaborated by the work of Black, Leon Williams, and others upon caries of enamel and the gelatinoid plaque.

That the presence of fermentable carbohydrates furnishes a ready food supply for these caries bacteria is true, but that their presence or the existence of physical defects in the tooth structure has any influence other than permitting a more rapid decalcification after decay has once begun, I question.

All of the conditions classed under exciting causes may be found in mouths in which caries has never existed, or in which it has long been inactive, but decalcification of tooth structure does not take place until some constitutional disturbance results in faulty metabolism, and then caries becomes active. The decalcification of tooth structure as a result of fermentation of carbohydrate material lying loosely in contact with tooth surfaces is of exceedingly infrequent occurrence; if it were not, few of us would have our teeth very long. The saliva penetrating through these loose masses of food dilutes and washes away the lactic and other acids before harm can be done to the enamel. That a general acidity of the saliva could be the cause of dental caries, is an untenable theory, as is conceded by all who are familiar with the clinical evidences of the beginnings and progress of caries.

The theory of the gelatinoid plaque as presented by Black and amply substantiated by Williams and others, is the only theory which presents any satisfactory solution of the well-marked tendency of caries to attack certain areas of tooth surface, and these only under conditions where the predisposing cause prevails. Not every mass of gelatinoid matter, or collection of food, or mucous material on a tooth surface is a gelatinoid plaque, but evidently these are frequently mistaken for one.

The essayist states that—"Plaques are found upon teeth immune to caries as well as upon teeth where there is arrested decay. It is also possible to find them where there is no acid decalcification beneath the plaque." As this statement does not appear in quotations in the copy of the paper that was furnished to me, I presume that it expresses the essayist's opinion. Such, however, has not been my experience.

Micro-organisms and carbohydrates will always be present in the mouth; they cannot be eliminated or largely controlled, but since they are harmless, unless the predisposing cause of caries, whatever it may be, asserts itself, our attention may well be concentrated on studying that predisposing cause or causes. We find micro-organisms and carbohydrates in every mouth, but until there is an *active predisposing cause,* we do not find the formation of *true gelatinoid plaques,* nor do we find caries beginning on enamel surfaces. There is evidently something in the saliva of mouths that are free from caries that prevents the formation of gelatinoid plaques, or else there is something lacking in the saliva of mouths where caries is active that permits this plaque formation.

Dr. DANIEL H. SQUIRE, Buffalo, N. Y. I wish to congratulate the essayist upon the thorough and painstaking manner in which he has presented this important subject in his paper, which denotes a great deal of hard work and thoughtful study. He gives to us a *résumé* of the etiology and progress of caries from the viewpoints of all the leading dental investigators. In reviewing this essay, the thought naturally arises that the final settlement of the exciting causes of caries must be determined by the several committees engaged in scientific research. Many of the predisposing causes, however, can be understood, and their influence upon the teeth lessened, by every dental practitioner. The high percentage of caries in the mouths of our school children is appalling, and furthermore is very significant. It shows a lack of determined effort upon the part of many dentists to do

their full duty toward prohibiting the progress of this disease.

Dentistry, when practiced only from a clinical knowledge, is empirical, and reminds one of the examples in the old arithmetic which used to be worked with only the answer in view, utterly devoid of any reasoning power. Observation of the operative procedures upon the tooth tissue still shows a lack of judgment and skill. Heredity and environment play a most conspicuous part in the causation of dental caries. These two great forces may work either in harmony or opposition; their final influence upon the dental arches and surrounding parts is unknown. Much depends upon the strength of these two forces as to whether the inherited tendencies will be characteristic of the parent or modified by the environment.

It is a fundamental principle of physiology that the use of an organ determines its strength. Those who have visited the National Museum at Washington, and have had the opportunity of viewing the skulls especially of dental interest, are much impressed with the anatomic formations of the jaws of the natural or partially civilized races. The massive development of the body and rami of the mandible is very noticeable. The ridges and eminences for the attachment of muscles upon either jaw are strongly developed and supported by reinforced elevations of bone. The teeth are large, well formed, and firmly fixed in perfect alignment in well-developed dental arches, and practically free from caries.

Pickerill points out that, if we would have strong, well-developed organs of mastication, our children from infancy must be taught to use the jaws properly. He also says that in the skulls of children of uncivilized races which he has examined the deciduous teeth showed marked signs of abrasion, and were free from caries and malocclusion. This leads us to believe that these children did not bolt their food nor live upon a soft diet, but, on the contrary, that their food was coarse, fibrous, and well masticated. It is a well-known fact that the orthodontist depends upon mechanical stimuli to increase the development of a part. This force is probably not greater than that of the resistance of coarse foods upon the occlusal surfaces of the teeth during mastication, and, while it is not constant, it may be what is needed for a strong development of these parts. It is further claimed that there is a distinct relationship between the frequency of caries and the advance of civilization. It is known that the prevalence of caries fell in England after the invasion by the Anglo-Saxons, who were less civilized than the Romanized Britons whom they displaced. The experiments made by Dr. Black in regard to the strength of the bite show conclusively that the force of attrition has been greatly impaired by atrophy of the parts involved, this being due to a lack of proper exercise. This condition, when coupled with advanced caries, makes thorough mastication of fibrous foods impossible, and of even a diet of soft materials superficial, and this is the condition that many of our school children present today. The change from a diet of soft to one of coarse nature must be gradual. Sex influences the amount of caries, which predominates by from 3 to 25 per cent. in the female as compared with the male. We know that between the ages of six and twelve years caries is most rapid, and that the jaws fail to develop to their normal size. There are periods of immunity from caries, but they usually occur after adult life has been reached.

In the report of the United States army, the fact was brought out that the upper teeth were much less resistant to caries than the lower ones; it also showed a marked susceptibility of the different types of teeth to become affected in the following order: First permanent molars, second permanent molars, upper central incisors, bicuspids, third molars, upper canines, lower incisors, and lower canines. Age and position, therefore, have a decided influence upon the progress of this disease.

Caries upon the approximal surfaces of the deciduous teeth has a direct influence upon the permanent teeth, and, as it progresses, there is a dropping to-

gether of the teeth mesio-distally; this space, which the contour of these crowns maintained originally, is lost, and the erupting teeth take abnormal positions, because the jaws do not develop to accommodate them. Any narrowing of the palate in the molar region will cause a bunching of the teeth in the anterior part of the mouth, which prevents easy cleansing.

From a study of these predisposing causes upon the inception of caries as set forth in the paper, it is apparent that, aside from determining the exciting cause of caries, there is a twofold duty to be performed by every practitioner of dentistry, namely, educational and intelligent service, one being as necessary as the other. The permanence of tooth restorations is of short duration if the patient is not instructed in the importance of home prophylaxis. In order to interest the parents vitally in the care and treatment of their teeth and those of their children, it is important to acquaint them with the relationship which a healthy oral cavity bears to the maintenance of a normal bodily function. The home care of the teeth must be systematically performed, and the results criticized freely by the dentist. The writer realizes that it is an unpleasant duty to tell a patient that his mouth is in an unclean condition, but, if it is not done, the dentist will some day be charged with neglect of duty, and will suffer the loss of the patient.

Understanding the laws of hygiene, the susceptibility to, and the conditions under which tooth tissues decay, the influence of heredity, environment, sex, and age, it is inconceivable how one can lay aside this knowledge and perform operations which show an utter disregard for all these factors. In our endeavor to solve the problems which are still hidden from us it is the opinion of the writer that we are losing interest in those things which we do know and understand. The fact still remains that we are not working in the light which we already have at hand.

Dr. Coolidge (closing the discussion). I have very little to say in closing —only to thank those who took part in the discussion for their kind words, and to thank the audience for their kind reception of the paper.

I wish to say, regarding Dr. Friesell's remarks upon a paragraph from my paper: That is not a quotation, neither is it entirely an observation of my own. He will find it in Kirk's article in the Dental Cosmos for July 1912, also in Pickerill's book. I may also direct him to photomicrographs in Williams' and Miller's articles published in 1902 and 1907 respectively, where the conditions that I spoke of are illustrated.

Section III then adjourned.

(Report of Clinics to appear in next issue.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-fifth Annual Meeting.

(Report continued from page 114.)

FRIDAY—*Afternoon Session.*

(Cont'd from vol. lv, p. 1282.)

The next order of business was the report of the Committee on Scientific Research, as follows:

Report of the Committee on Scientific Research.

By Dr. W. B. DUNNING, Chairman.

For four years we have been fortunate in having the services of Prof. W. J. Gies of Columbia University to carry on the work of the committee in harmony with a plan decided upon from time to time. It has been the object of the committee during that period to take up whatever subject we might choose, in as thoroughgoing a manner as possible, and from the beginning it has seemed that the general subject of the causation of dental caries and its possible prevention were the paramount problems to be considered.

The committee has acted in an administrative way only with Dr. Gies—that is, in an official capacity; Professor Gies has not only done the work, but has dominated the conduct of our whole policy. In his last year's work he felt it important to investigate thoroughly the subject of sulfocyanates, as they appear in the fluids of the body and not merely in the oral cavity. His report last year, as it appeared, speaks for itself, but he felt that certain phases relative to the origin, physiological significance, and pharmacology of sulfocyanates had not been investigated sufficiently to close this subject. He has, with the assistance of two able men, Dr. Lieb and Dr. Kahn, prosecuted this work during the current season, and will now present his report. It gives me much pleasure to introduce to you Prof. William J. Gies.

Professor GIES then delivered the address entitled "A Further Study of Sulfocyanate in Its Possible Relation to Dental Caries."

[This address is printed at page 175 of the present issue of the DENTAL COSMOS.]

The PRESIDENT. I have much pleasure in announcing that Dr. Gies has been elected an honorary member of the Dental Society of the State of New York.

Dr. GIES. Elections to honorary membership always imply a most friendly and amiable relationship. I do not deserve any honor at your hands. The work we have done has been a very modest one—merely the beginning in a field in which we have very much to learn. I fully appreciate the pleasant mutual relationship that this action of yours suggests for the future. It will give me all the more satisfaction to cooperate in any possible way that I can toward the successful attainment of the worthy objects for which you are banded together. I consider dentistry an honorable part of medicine, just as important a part as any other that receives special attention in medicine. Your functions are primarily those of preventing and curing disease, and I hope the time will soon come when the dentist will be a medical man not only in fact but also in every sense of the word.

I am thoroughly appreciative of the honor you have conferred upon me, and I hope I can show that appreciation, in

the near future, in deeds instead of in words. I thank you for your kindness. [Applause.]

Discussion.

Dr. F. W. Low, Buffalo. As a preliminary, I would say that I was rather disappointed recently in receiving a letter from Dr. Gies informing me that sodium sulfocyanate in therapeutic doses was harmless. Last winter I received from Dr. Max Kahn, who is one of Dr. Gies' assistants at Columbia, a very instructive pamphlet telling of the history of the investigations regarding potassium sulfocyanate and many of the experiments that Professor Gies made during the year 1912, and Dr. Kahn finished with the conclusion that potassium sulfocyanate *was toxic* to animal and vegetable life; that its toxicity was so great as to make it dangerous to prescribe indiscriminately! Therefore I came to this meeting ready for a tilt with Professor Gies, and prepared a discussion that I will not now read, because of his conclusion presented this morning, viz, that sulfocyanate in therapeutic doses is harmless. This disposes of one-half of the contention over which we implacable belligerents have been so determinedly at variance.

The first question I now want to ask Dr. Gies is, If the sulfocyanates as found in the saliva constitute only a waste product—that is, a waste product of the liver—and are not of any functional use, why did the Almighty plan that it should go around and around in the saliva, through the stomach again and again, instead of being eliminated through the feces and urine? The dog, I believe, does not have any sulfocyanate in the saliva, but eliminates it all from the stomach through the feces, and if it is of no biologic value in the saliva of man, why do not we eliminate it like the dog?

As to the question of whether or not the pharmacological dose will do any harm, I will say that when I thought it was intended that I should be gibbeted and possibly drawn and quartered here today, I had secured evidence that one young man in Europe, according to one of the reputable medical journals of Europe,* swallowed at one dose a whole ounce of *ammonium* sulfocyanate. He vomited after fifteen minutes and again in six hours, after which he felt giddy for a few hours, and later eliminated great quantities of sulfocyanate in the urine and feces for two weeks. After this, he returned to a normal condition. I have made one experiment that I consider of value upon a grown individual, and I had hoped to have him here, but his mother's health was such that he could not come. In this connection, I wrote Dr. Gies recently that I was better off than the old darkey doctor who, in reply to a question as to his success in his work said, "Yes sir, Mr. Johnson, I have had a great deal of success; out of the seventeen patients what I have treated this year, only thirteen have died, and *not one of them* died of the disease what I was treating 'em for."

One other matter only I wish to speak of, and that is, I have had a visit with Dr. Gies today, and I am going to make experiments to determine the viscosity of the saliva both before and after the sulfocyanate treatment, also tests to show whether the alkalinity and acidity of the saliva are affected by this medication.

I have here forty postal cards that I have received from patients, but I do not dare read them to you, first, because it would take too long, and also because, as Professor Gies said when he read them over this morning, they sound so much like patent medicine advertisements. The suggestion was made by Professor Gies last year that I should not report one or two favorable cases, but all that I could get. In the six years that I have been following this treatment I have had only seventy-one or seventy-two cases in which I have found it necessary to administer sulfocyanate, and I sent out sixty cards to these patients. Some of them had died [laughter], but not more than thirteen; some had married and moved away. I sent out return postal

* See report of Dr. O. Adler in the *Deutsche med. Wochenschrift*, 1910, No. 48, page 2271.

cards to these patients asking them the following questions:

(1) Do you recall the circumstance of having taken some little tablets during the month of July 1908, which I prescribed for the purpose of correcting an excessively ropy or stringy condition of your saliva, which I thought was bad for your teeth?

(2) At the time I asked you to observe from day to day as the medication progressed, until all the tablets were taken, whether the saliva gradually became less thick and mucinous. Can you remember now whether you thought at the time that any improvement was noticeable on account of that treatment?

The first card that I received was significant—it came from the dead-letter office. [Laughter.] The next one I received said that the patient had not noticed any difference; then five or six followed from patients who could not remember. One or two could not remember exactly about the conditions at the time of treatment, but said that, in a general way, they were aware that the saliva was very much improved, and the rest pronounced eulogies that my modesty would not permit me to read here.

It may be said that lay patients are not competent to tell whether their saliva is better or worse. Professor Gies wrote about that, but you will notice that I asked the patients whether they noticed a more or less stringy or ropy condition of the saliva, and I claim that a layman can tell whether or not he is spitting shoestrings, and that was the question that determined in my mind whether they were getting better or not. Dr. Gies says that the sulfocyanate has no effect on the teeth. I believe that it has, because it has *some* effect upon the system of the individual, but even more upon the metabolism of the bacteria in the mouth whereby they are stimulated; and while we found that they did grow more rapidly when they had been stimulated with the potassium sulfocyanate, yet we hoped that the stimulation was such that they did not feel the necessity of throwing out a protective cover, thus doing their mischief under the plaque such as has been described by Dr. Black.

G. Treupel and A. Edinger (*Muenchener med. Wochenschrift,* Nos. 21 and 22; and the same, 1901, No. 31, and 1902 No. 14) have made exhaustive investigations on the physiological action of the sulfocyanates, and arrive at the conclusion that doses of 0.3 to 0.5 gm. (4½ to 7½ grains) of sodium sulfocyanate are borne very well by human beings. The continued use of this salt considerably reduces the acidity of the urine and diminishes the amount of uric and phosphoric acid eliminated. If its administration reduces acidity of urine, why should it not be able to reduce that of the saliva—my experiments so indicate.

I am next going to ask Dr. Gies if he has made any experiments to ascertain the physiological effect of potassium sulfocyanate upon the bacteria of the human mouth. In the test-tube cultures experimented with, did the presence of sulfocyanate stimulate rapidity of growth?

I have always disputed Dr. Kirk in his contention that the only reason why chlorid of iron, if administered by the stomach, does any harm to the teeth is because of the local effect of the acid constituent of the iron coming in contact with the teeth. I dispute that, and I believe the reason why it does harm is because it takes potassium sulfocyanate out of the saliva and gives the bacteria a better chance. Dr. McCoy is present, and I wish he would cite his experience in taking the different preparations of iron.

Dr. W. H. McCoy, Buffalo. A few years ago Dr. Low made a test of my saliva and found it rich in sulfocyanate, and I felt glad to think I was in no danger of suffering from rapid caries, having had very little trouble with my teeth previous to that time. About a year ago I became anemic, which necessitated my taking iron, which was administered hypodermically, the solution used being a combination of citrate of iron, arsenic, and strychnin.

After being treated for ten days, Dr. Low made a second test and found my saliva had faded out to a No. 2 color, which is considered very light, and shows a decided lack of sulfocyanate. I dis-

continued the hypodermic treatment for a while and took chlorid of iron through the stomach. Another saliva test was made, which showed a slight increase in sulfocyanate. From these tests I conclude that iron passing through the mouth and coming in contact with the teeth does not cause rapid caries, but this effect is produced by the iron reducing the amount of sulfocyanate in the system.

Dr. H. C. FERRIS, New York. It would seem as if Professor Gies' experiments were conclusive on this subject, but my clinical experience does not agree with his findings. It is possible that my work was not as accurately done, but I have sufficient confidence in my own ability in the handling of a sphygmometer to have the courage of my convictions. It is not a difficult procedure to record the blood pressure with the improved instruments of today, and anyone of average skill can make an accurate reading. I have made hundreds of these examinations, and my findings upon patients treated with sodium sulfocyanate have shown in every case an increased blood pressure. It is probable that these findings may have been due to the chemistry of consumed food, but if that is true in my experience, it would also be true in the experience of Professor Gies, in inverse order.

I have also noted in diabetic cases that a urinary specimen that was as thick as molasses would become clear in the course of forty-eight hours, with no other medication. If this drug is an inert product, and has no physiological influence upon the system, I would like to have Professor Gies explain how this might occur. I would like also to ask Professor Gies if, in his examinations of these men and himself, the salivary analysis was made before and after the treatment, or during the period of the treatment, and if so, whether any centrifuged solids were recorded.

I have in mind the history of a case that I treated with extreme care, and in which the diet was rigorously observed, and my observations were check-tested by Dr. C. E. Scofield of Brooklyn. The results of this case I published a year ago in the Transactions of the State Society. That there were physiological manifestations in this patient was a positive fact, and as a result of my experience in a number of other cases, I am not convinced but that there may be some point in Professor Gies' experiments that has been overlooked.

Dr. LOW. What were the physiological effects precisely?

Dr. FERRIS. Those published a year ago were upon the blood pressure and the centrifuged solids in the urine.

Dr. LOW. What were your doses in the recent case you reported? Were they three grains a day?

Dr. FERRIS. One-half grain at a dose.

Dr. LOW. You gave the doses more than once a day?

Dr. FERRIS. Yes, two or three times a day. Blood pressure was so affected when the patient returned in three days, that the reading of the instrument was nine degrees higher, and she complained of fulness in the face and head, and asked if I thought she should continue the treatment. I told her to stop it, and in another twenty-four hours the blood pressure was reduced to its original condition.

I hope we may have more experimental work upon human beings before we consider this drug in the light of Professor Gies' report.

Dr. J. W. BEACH, Buffalo. I would like to say a word in commendation of the report which Professor Gies has given us this afternoon. It marks a period of something tangible; it has reached the point where we have something decisive to work on. Heretofore the work of Dr. Low has been as scientific as the means at his command allowed, and his results have been produced and his conclusions have been reached in an honest and fair way, which is characteristic of everything he does, and these results have been gratifying to me. I have been intimately associated with him, not as a collaborator but in watching his work, and at its initiation I was drawn into it. Possibly I may have prescribed sodium sulfocyanate as much or more than Dr. Low in my own practice, and I have felt all along that I have had

tangible results. Of course, this treatment was not based upon scientific principles which would stand, but my results were gratifying. I have passed through all the stages of the effect of the administration of sulfocyanate on the tissues. It is the environment of the teeth that we refer to in its beneficial effect, and not any positive action on the tooth structure itself; it merely changes the conditions, which results in benefit to the teeth and mouth generally. Of course "the proof of the pudding is in the eating," but I am especially gratified that Dr. Gies has been able to bear out Dr. Low's work to the point that potassium or sodium sulfocyanate is not harmful to the individual. This finding enables us to begin on a scientific basis, and I trust that Professor Gies will be able to carry us along farther, and to bear us out scientifically in what we have been doing in the past in an empirical way.

Dr. L. M. WAUGH, Buffalo. The report to which we have listened must be accepted by us as being conclusive so far as it goes. I feel with Dr. Ferris, however, that it may not go quite far enough. Scientific facts are of practical value only as they bear out the conditions that we see every day, and for that reason I will argue in favor of further work in this particular field of investigation. I know that Dr. Low has been somewhat disappointed in my position in connection with the potassium sulfocyanate administration. Five years ago, when I was chairman of the committee, we tried to decide the influence of potassium sulfocyanate on bacterial plaque formation in test tubes, and Professor Gies, when he first did that work, repeated the experiments under somewhat better conditions, but, possibly because of lack of knowledge of dental conditions, he did not get the result we obtained. We did what we could to verify our conclusions with laboratory work, but the results which Dr. Gies produced largely contradicted our findings. Personally, I administered sulfocyanate to a few patients, and there was a coincident improvement in their mouths, but I could not quite make up my mind as to whether the improvement was due to the medicine or to the fact that my enthusiasm had stimulated the patient to take better care of his teeth, although I aimed to avoid this. I have never said this to Dr. Low, but I could not feel convinced that sulfocyanate might not in some way perform some function in the body other than what we knew of, but now that Dr. Gies has told us that it does no harm, I am ready to administer it further. While I realize that, as Dr. Gies says, we cannot control this in practice as is done in research work, yet as we administer this drug to patients in our practice, it will be used under the conditions in which the dental profession will have to administer it.

Dr. Gies has suggested that perhaps the reason why we always found a better condition of the mouth after administering sulfocyanate might be the fact that the patient was then under dental treatment. Dr. Flagg showed years ago that there are periods of susceptibility and comparative immunity to caries. The susceptible ages are during adolescence, from thirty to thirty-five years, forty-five to fifty years, sixty to sixty-five years, and senility, the intervening years being periods of slow progress. I have watched this in practice, and it is surprising to what extent this statement is borne out in the average patient's mouth. Dental caries is attributable to two causes, one exciting, the other predisposing. We know the exciting cause to be the growth of bacteria which form plaques, and the one important factor which we do not generally recognize is that the exciting cause is largely dependent upon the predisposing. The predisposing cause is the problematic part, and, according to Black, may be either a temporary lack of oral hygiene or some constitutional condition which so modifies the constitution of the oral fluids that it will favor the formation of the bacterial plaque. That is a problem to which Dr. Gies alludes today, and we want to get at the conditions which will bring about the change in the oral fluids which will favor immunity to caries, or retard the exciting cause of

bacterial plaque formation. I do not believe that it is merely the fact of dental treatment being instituted that is responsible for stopping these conditions, for we find that caries still goes on in many mouths, in spite of all we can do to prevent it. It is something more than the condition of the mouth merely —it is a constitutional condition which modifies the oral fluid, and I think it is in that direction that we must continue the work.

Last year the Correspondent brought in a report on the administration of iron. Our schools had taught that iron in itself was not harmful to the teeth, but that iron preparations that were acid in reaction are harmful in their action upon the enamel. Dr. Truman said he believed that not only acid preparations of iron but iron itself modified the constitution of the saliva, and I thought of what Dr. Low told us, that, when iron is given, sulfocyanate passes from the saliva, and it may be in that respect that iron can be productive of harmful results.

The one hopeful feature of this whole discussion is that no matter what the final result may be, we have made some advancement in the matter of research and are gradually approaching the truth. As a member of the committee I hope that Dr. Gies can see his way clear to go farther with his investigations of potassium sulfocyanate by administering it to humans, and checking its effect upon the chemistry of the oral fluid.

Dr. Gies (closing the discussion). Referring first to the concluding remarks by Dr. Waugh, let me remind you that I have formerly suggested that any further study of sulfocyanate, under your auspices, be put in the hands of practicing dentists. Our results have taken this sulfocyanate research out of the laboratory, so to speak, and put it into the dentist's chair. I am not competent to undertake the clinical study I have suggested, because I know too little of the clinical aspects of dentistry. I should be happy, however, to suggest conditions, among others, on which such a clinical study might profitably be based and conducted. If you have faith in the possible curative powers of sulfocyanate, by all means put the possibility to a thorough test—ignore all we have suggested! Even if you do not have such a faith, it would be well to settle this therapeutic question once for all by subjecting it to a rigorous clinical test. I suggested this a year ago. I again advise it, and should cheerfully co-operate from advisory and critical standpoints, if I could be of service to you. Expert dentists who believe in the sulfocyanate treatment, and others who do not, should be encouraged to proceed with co-ordinated efforts to solve the problem.

Dr. Ferris has failed, apparently, to distinguish between the mechanical ease with which blood pressure may be ascertained at a given moment in a particular individual, on the one hand, and the clinical difficulty, on the other, of preventing the incidence of influential though unrecognizable factors that complicate the significance of a prevailing degree of pressure. Anybody can look through a telescope, but how many such are astronomers? I stated in our report that the blood-pressure determinations were made by my colleague, Professor Lieb of the Columbia department of pharmacology, who has been specially trained for such work, and gives all his time to it. As to Professor Lieb's professional capacity, I wish to quote the following remarks, with which Professor Bastedo concludes the preface to his splendid text-book on "Materia Medica, Pharmacology, and Therapeutics": "For the use of a number of tracings I owe my deepest thanks to my colleague, Prof. Charles C. Lieb, whose care about the details of an experiment and accuracy in recording results I believe to be unsurpassed." Professor Lieb is well known as a particularly competent pharmacologist.

Instead of suggesting that a trained pharmacologist has "overlooked some point" in a technical pharmacological study, I believe it would be more logical for Dr. Ferris to intimate that probably he himself, the trained dentist, "overlooked some point" in a field of study for which he appears to have no special training or aptitude. It is better for

each of us to "stick to his last" than to "stand by his guns" in science.

I do not know what Dr. Ferris means when he suggests that "it is probable his findings may have been due *to the chemistry of food*." He certainly is wrong, in spite of his modesty, when he suggests that "what is true in his experience [in this connection] would also be true in the experience of Professor Gies, in inverse order."

Dr. Ferris inquires whether the salivary analysis was made before and after or during the period of treatment of Messrs. Miller, Knudson, and myself, and if so, whether any centrifuged solids were recorded. During the period of treatment we deliberately attended solely to pharmacological matters in this connection. The collection of saliva, in quantities sufficient for adequate salivary analysis, might have introduced such influences on each subject as we sought particularly to obviate. There were no effects on my own saliva that attracted my attention, though I was alert for them. I have already said that the sulfocyanate content was increased after the treatment. "Centrifuged solids" were *not* recorded. Even if saliva had been available for systematic analysis, we should have been unwilling to waste time on a method which is as crude and useless as the centrifugation process for the comparative quantitative determination of "solids" [particles] of different degrees of density, in a changeable secretion of variable viscosity. Counting the air-bubbles, per unit of volume, would probably be as useful—and that certainly would be physiologically meaningless.

Dr. Ferris states that he has also noted in diabetic cases that a urinary specimen that was as thick as molasses would become clear (!) in the course of forty-eight hours, with no other medication than dosage with sulfocyanate, and then asks, "If this drug [sulfocyanate] is an inert product and has no physiological influence upon the system, I would like to have Professor Gies explain how this might occur." I should wish to witness these phenomena before trying to give the answer. I think of Mark Twain's comment in another connection when he said, "Important, if true." I do not understand how all this could be true of a urinary specimen. Besides, how thick is "thick as molasses?" This is about as scientific a phrase as the expression "heavy as wood" or "hot as water." Dr. Ferris says nothing in this connection of the nature and quantity of the daily diet, or the amount of water taken per day. Besides, if he gave doses large enough and frequently enough to elicit ordinary "salt action," perhaps the sulfocyanate induced diuresis and the mechanical change to which he alludes.

There is nothing in Dr. Ferris' statement to indicate that the patients he mentions were adequately controlled for the conclusions he announces.

My good friend Dr. Low, and I, have not yet recovered from the habit of disagreeing with each other, but I think we are giving strong evidence of a tendency to improvement in that direction. It is a great personal pleasure to say today that, in the light of our experimental results, there is good reason for thinking that Dr. Low's use of sulfocyanate for intended therapeutic purposes has not done any harm to anyone. In retreating to this point from the judicial position taken a year ago, I do so in accord with and forced by our experimental findings. In view of the benefit to humanity that would accrue from any real prophylactic utility which sulfocyanate might possess, I hope I may have the pleasure next year, as a result of further discovery, of retreating the rest of the distance to Dr. Low's camp; although, as I size up his position today, through the same old telescope—"show me"—I think I see "faith cure" in large letters over the opening in his tent, and the doctor himself the personification of Faithful rather than Factful.

The pamphlet by Dr. Kahn, to which Dr. Low refers, was written before our report was presented to you a year ago. It gives the toxicological results in more detail than our report to you offered them. The results fully warranted the fears that were then expressed. Our later pharmacological study, with much

smaller doses, removed that fear so far as therapeutic doses in healthy people are concerned. Dr. Low should not forget the fact that last year his basis for the opinion that his recommended doses of sulfocyanate were harmless was a statement in a trade journal (Merck's).

Dr. Low states that Treupel and Edinger found that the continued use of sodium sulfocyanate "considerably reduces the acidity of urine and diminishes the amount of uric acid and phosphoric acid eliminated!" But such effects are undesirable! Dr. Low further inquires, "If its administration [sodium sulfocyanate] reduces acidity of urine, why should it not be able to reduce that of the saliva?" There is no physiological point in this. Dr. Low might as well ask, If the ingestion of physiological amounts of sodium chlorid facilitates the maintenance of the normal acidity of gastric juice [which it does], why should it not be able to maintain that of the saliva [which is does not].

Dr. Low has put me in a very embarrassing position by insisting that I reveal to you the reason why the "Almighty planned that sulfocyanate should go around and around in the body," instead of being ejected directly and immediately. It is evident that Dr. Low has learned in some way that I am fully informed of the Almighty's plans, but why he should wish me to give them away, and publicly, too, is more than I can understand. I admit this is showing poor appreciation of your cordiality in electing me an honorary member of your society—to decline to return the compliment by giving you inside information—but I feel that you will excuse me if in my embarrassment I delay, until next year at least, any violation of the confidential relations into which Dr. Low seeks to break. If it is ultimately shown that sulfocyanate is useless from the therapeutic standpoint, Dr. Low need not be surprised to learn, on judgment-day, that the situation changed suddenly as a result of his indiscretion of today in seeking to beguile me into making the revelation he has solicited.

I hope Dr. Low will stick to his purpose to follow the line of my criticism last year, that is, to study as many cases as possible and report the results respecting all, instead of a few selected ones.

Dr. Low is surely correct in assuming that the laity can tell whether or not they are spitting shoestrings, but let us be sure that Dr. Low is stringing neither himself nor us.

I have made no experiments on the influence of sulfocyanate upon the oral bacteria since those reported by us three years ago. That first study very definitely indicated that sulfocyanate, in the proportions of its occurrence in saliva, did not modify the oral bacteria either structurally, nutritionally, or functionally. I believe that Dr. Waugh is wrong in considering this field a dental rather than a bacterio-chemical one. I am satisfied our findings were entirely reliable. Last year we indicated that yeast grows very well in glucose solutions containing very large proportions of sulfocyanate.

Before we draw any conclusions about the influence of the administration of iron on the amount of sulfocyanate in saliva, we should be sure that a definite effect of the iron has been established. It does not appear from the discussion that the diminution alluded to has resulted from the action of iron itself. Have other soluble salts of iron been tested in this connection—salts that are not acid? If, however, the administration of iron reduces the proportion of sulfocyanate in the saliva, let me suggest that the reduction may be due to events in the liver that involve the formation there of ferric sulfocyanate and its elimination in the bile, with corresponding reduction in the proportion of alkali sulfocyanate available in the blood for excretion through the salivary glands. I shall endeavor experimentally to determine the facts in this connection.

In Dr. McCoy's case the phenomena he discusses may be explained as direct results of the anemia, rather than the medication he mentions.

There can be no question that ferric chlorid solutions, with their comparatively large proportions of hydrochloric acid, are directly injurious to the teeth because of the action of the contained

mineral acid. I have been studying for some time the effects of "food-acid" media on teeth. It is evident that such organic acid materials as fruit and vegetable juices are not only harmless in the quantities ordinarily eaten, but also may be used to advantage as dentifrices, since they (1) disintegrate and dislodge mucous films and deposits on the teeth, tongue, and oral surfaces in general, (2) tend to destroy or injure oral bacteria, and (3) stimulate salivary after-flow. Such food-acid media are *weakly* acid, *i.e.* the proportion of hydrogen ions due to hydrolytic dissociation is very small, and consequently the degree of resultant decalcification is negligible. On the other hand, hydrochloric acid is a *strong* acid, *i.e.* the proportion of hydrogen ions in its solutions is very large, and, accordingly, even very dilute solutions are strongly decalcifying in their effects. The oral fluids appear to fortify the teeth against the decalcifying tendency of the former—food-acid media—but do not seem to do so effectively against the decalcifying power of solutions of mineral acid.*

In discussing sulfocyanate as a preventive of caries, do not overlook the significance of the facts involved in the time-honored expression, "Clean as a hound's tooth." Dog saliva is free from sulfocyanate and even when a dog subsists for years on a diet containing much carbohydrate, its teeth remain clean and free from caries. How can this be explained on the basis of the sulfocyanate prevention theory?

Adjourned until the Friday evening session.

FRIDAY—*Evening Session.*

The meeting was called to order on Friday evening at 8.30 o'clock, by the president, Dr. Baylis.

The first order of business for the evening session was the reading of a paper by Dr. G. V. I. BROWN, Milwaukee, Wis., entitled "The Pathologic and Therapeutic Possibilities of Upper Maxillary Contraction and Expansion as Evidenced by Experiments upon Guinea-pigs, Rabbits, and Dogs, in Confirmation of Clinical Observations in Human Cases."

[This paper is printed in full at page 137 of the present issue of the COSMOS.]

Discussion.

Dr. A. W. CUTLER, Oneonta, N. Y. Dr. Brown has so completely covered the subject that little remains for the practitioner of general surgery to say. There are a few points, however, that I would like to speak about. The sentence that attracted my attention particularly is that in which he impressed upon the members of the dental profession the importance of early recognition of what may prove something more than a deformity of the jaw, for such a deformity is often the initial symptom of graver disturbances which, if recognized in their early stages, may be led to complete recovery, while, if allowed to remain unchecked, it may possibly mean that a boy or girl will be nothing more than an imbecile.

Vesalius, in 1553, began the argument about the pituitary body which has been carried on up to the present time, and I am glad to say that we know a little more than was known in the fifteenth century, though not much. If we stop to consider, we recognize the fact that there is some governor somewhere in the economy, probably something of the nature of the ductless glands, which has much to do with the functions and development of the body. Just how much the pituitary body contributes its share to this, I regret I am not in position to tell. We do know, however, that a high palatal arch pushing the bones of the face and the base of the skull upward, and making the drainage of the accessory sinuses of the nose difficult, usually produces a condition of mentality that is poor. I think this observation has been made by all careful in-

* This matter has been more fully considered since the above discussion took place. See Lothrop and Gies: *Journal of the Allied Dental Societies*, 1913, vol. viii, p. 283.

vestigators. Whether the spreading of the palatal arch and facilitating the drainage of the accessory sinuses brings about this condition of improvement, or whether the removal of the block in the circulation allows the function in the pituitary body which may have been impaired to be resumed, is a question open for discussion. The pituitary body was discovered and the first study of it made in 1838 by Rathke, who traced its development from two different sources, finding that the pituitary body is a complex body, composed of ciliated tissue or glandular tissue, like the thyroid and thymus glands, in one portion, and consisting in the posterior portion, if I am not mistaken, of neurotic tissue, particularly. It would require too much time to stop to consider the anatomical construction of this gland and its possible functions. I will state, however, that from the point of view of the general surgeon, the drainage of the sinuses of the head and face and the removal of obstructions from the nasal cavities have been followed in almost every instance by increased mentality and better physical development of the individual. There is also a nervous element in the pituitary body, which may account for improvement in the circulation. In a case of chorea in a girl of fourteen years of age, upon the removal of the adenoids and tonsils—the blocking of the circulation—recovery ensued in an almost incredibly short time, without any other treatment of the patient's nervous condition.

Dr. F. L. Stanton, New York. In the last few years, our essayist has appeared before medical and dental societies, and has advocated this operation for the improvement of breathing. When Dr. Brown first advocated this treatment, he laid no stress on the necessity of establishing occlusion of the teeth as a part of the operation. I was glad to hear him say tonight that he does pay attention to this phase. I feel the evidence would have been more convincing if he had presented one or two cases in which he has completed enlargement of the nares and obtained occlusion of the teeth; for if there is one word that should stand out in any operation influencing the movement of teeth, it is the word *occlusion*. I repeat that his evidence would have been stronger if he had presented one single case showing the results from the viewpoint of normal occlusion. As Dr. Gies has said today, we should approach our scientific work in a critical attitude, and I believe before any dentist attempts the spreading of a child's arch in the manner advocated by the essayist, he should carefully go over the experiments of Dr. Brown as outlined in his papers. When I became interested in this work, I read the essayist's papers, in which he maintains that many times in the cadaver, by the application of a simple jackscrew, he has opened the median suture.

Dr. Brown. Not so; I said that I regarded the skull proposition as very uncertain—that you could not tell much about the cadaver.

Dr. Stanton. As I read the articles, you said that many times you had performed this operation in the laboratory, and could easily open the median suture with the jackscrew.

Dr. Brown. I never said anything of the kind.

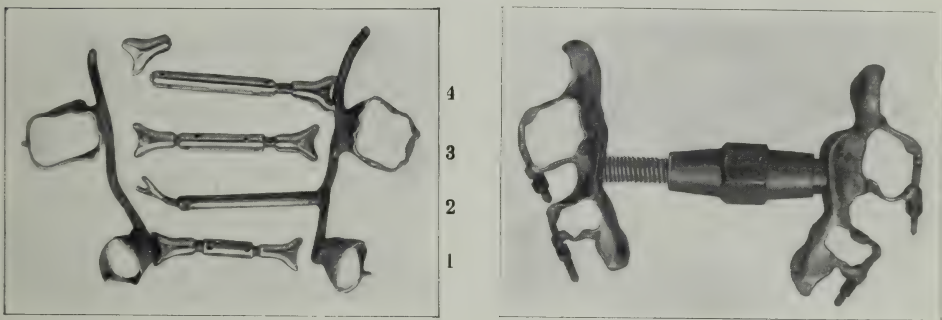
Dr. Stanton. In order to verify the experiments of Dr. Brown on the cadaver, I obtained a green skull. To make the record of the experiment more complete, I took plaster impressions, and made an accurate model of the occlusion before I started. (See Fig. 1.) I then placed in position the appliance shown in Fig. 2, a, made after Dr. Brown's description and illustration. I turned the jackscrew, No. 2, until it bent upon itself. I then reinforced the appliance with three S. S. White steel jackscrews (Fig. 2, Nos. 1, 3, and 4) and screwed and broke one of them and several instruments which I used in turning these jackscrews. I then made the jackscrew illustrated in Fig. 2, b, and turned this appliance until the bones began to break, and the Angle "D" bands which had been used for anchorage were torn from the teeth. I had previously dissected

away the soft parts covering the palate, in order to see the suture when it would open. This it failed to do, as is shown in Fig. 3, which shows the condition at the end of the experiment. I then removed the appliance, and the teeth of the upper jaw, which had been moved into complete buccal occlusion with the lower, sprang back toward their original places, as illustrated in Fig. 4. Fig. 5 illustrates the skull with the last appliance in place, showing that the upper arch has been spread entirely outside the lower.

I repeated Dr. Brown's experiment, and, having failed, I multiplied the force he applied in opening the suture on the cadaver many times by the use of the appliance illustrated in Fig. 2, and offer the results as evidence, having carefully repeated his experiment and

Fig. 1.

Fig. 2.



A B

Fig. 3.

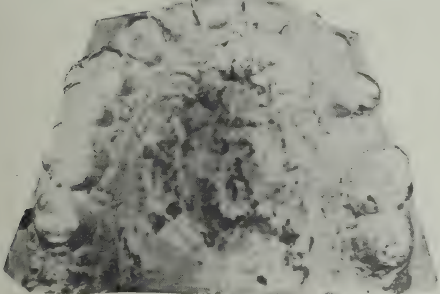
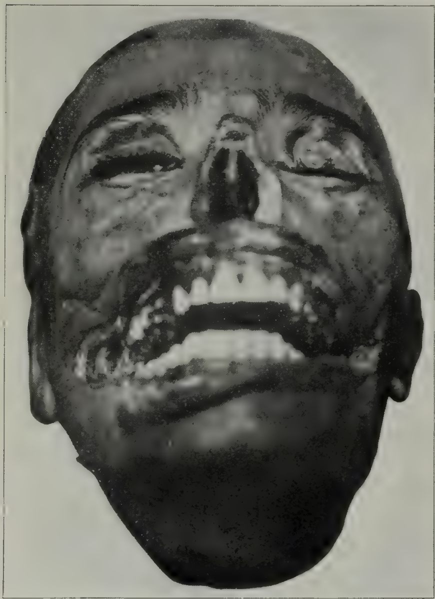


Fig. 4.

surrounded it with as much care and detail as would seem necessary in order that others may check up the results.

FIG. 5.



The skull is preserved in the Cornell Medical School at New York, and the appliances I have at my office.

Dr. H. C. FERRIS, New York. What effect would be produced in the arches a year or a year and a half after this operation has been performed? Would the nasal cavity return to its normal size, if the teeth were not retained in position? We find in rapid expansion of arches that the more rapid the operation, the more rapidly the teeth return to their original position. The question of separating or opening the suture between the maxillæ is an open one. The majority of orthodontists are not satisfied with the evidence presented at the present time. I was very much interested in hearing the essayist's report, and am very anxious to see some of the cases in which this operation has been actually carried out.

Dr. R. H. HOFHEINZ, Rochester. Does the essayist use a special technique for spreading the arches, or does he use one that is known to us in general practice?

Dr. F. C. KEMPLE, New York. I would like to ask whether the essayist made radiographs of the cases that he showed on the screen previous to his operation, and compared them with radiographs that were made following the operation. What difference did he find in the radiographs made prior to and those made after the operation? As a matter of evidence, the radiograph is more or less disappointing at best, because of distortion of the shadow that necessarily goes with it, and the impossibility of getting exactly the same relation of tube, plate, and subject in two or three exposures. In most cases three or four different shadow conditions will be found in so many exposures.

This question of spreading the arch and its effect was discussed before the American Society of Orthodontists in Chicago last summer, and we were unfortunate in not having Dr. Brown present at that time. He was on the program to discuss one of the papers, but, because of some confusion in the dates, he was not able to come. At this time Dr. M. H. Cryer of Philadelphia presented a theory which appealed to me as the most plausible explanation of the restoration of normal breathing after spreading the upper dental arch or enlarging both upper and lower arches; his theory is that, by the constricted dental arches, the tongue is crowded back into the pharynx in such a way that it closes the air-passages and prevents any breathing. In order to breathe, the patient is forced to open his mouth and release the soft palate. When the dental arches are enlarged to normal the tongue is given opportunity to move forward into its normal position; the soft palate is released, and the patient can breathe through the nose.

During mouth-breathing, owing to lack of function, the membranes of the nasal tissues become engorged and somewhat hypertrophied, and the nasal passages more or less constricted. As soon as the tongue occupies its normal position in the arch and the patient begins to breathe through the nose, the restored

function of these tissues re-establishes the normal condition of the nasal passages.

It has been questioned whether the enlargement of the nasal passage is simply a return to the normal condition of the nasal tissues, or whether it is an actual enlargement of the nasal passages. Whether the maxillary suture is separated or not is a matter of little importance; it is the beneficial effect obtained by the patient that is the important consideration.

Dr. H. S. DUNNING, New York. I would like to ask Dr. Brown what percentage of cases of acromegaly are improved by the expansion or opening of the suture, as he described it.

Dr. BROWN. I never meant that.

Dr. DUNNING. You spoke of the pressure at the sella turcica of the sphenoid bone, and of relieving that pressure by opening the suture. I cannot see how you relieve that pressure on the sella turcica of the sphenoid bone, or relieve pressure on the foramina at the base of the skull. You speak of the large vessels and nerves that pass through the foramina in the base of the skull, and how pressure might cause disturbance in this region. I can see how the nasal and the accessory nasal sinuses are enlarged and better drainage established, but I do not quite understand how, by opening the suture of the maxillary bones, pressure on the sella turcica or pressure on any part of the body of the sphenoid can be relieved.

Dr. OSCAR CARRABINE, New York. I have listened to the paper with much interest, and think we should do this work more slowly, and mark the occlusion more closely. How do we detect malformation of the bone? I believe that in the practice of orthodontia we are correcting malformation and malposition of the maxillary bones. We use the teeth simply as a guide. There is malformation or malposition of the maxillary bone before the first molars are erupted, and when they erupt either mesially or distally, we use the teeth as a guide to note the correct position of the maxillary bones. Since we are treating malposition of the bones, and the only real guide we have is normal occlusion of the teeth, I think it is more humane, and it seems to me more reasonable, to do this by orthodontic measures, and not so rapidly. By moving all the teeth, both upper and lower, gradually to their normal positions, we obtain the same results as by the method Dr. Brown has advocated. Orthodontists have noticed in many patients the same improved mentality that Dr. Brown has mentioned, and we obtain this result in a slower and, I believe, a better way. As I understand, Dr. Brown employs the jackscrew and produces pressure without consideration of the occlusion or position of the mandible or the lower teeth, and it would seem better for the health of the patient to use a slower method, taking into consideration the occlusion of the teeth.

Dr. BROWN (closing the discussion). With reference to Dr. Stanton's experiment, I can only say that I know perfectly well that what he undertakes he does sincerely and earnestly. I am satisfied that he did encounter the difficulties which he has described, but he made an error in saying that I have ever said this result was easy to accomplish upon a green skull, or that I had done it often.

We did separate the median palatine suture of a skull supplied by Dr. L. W. Dean of Iowa City, from the anatomical room of the University of Iowa, by the use of an expansion appliance exerting pressure across the palate, at a meeting of the Section on Stomatology of the American Medical Association at its last Chicago meeting, and this skull was examined by all who cared to do so. The experiment was performed in the presence of reputable men, and there can be no question about any of these facts.

I will not take your time further in discussing whether this result can be accomplished or not, because I am ready to do it, and let you be the judges. Only one word more, so that you may not be under a wrong impression: I would not attempt for a moment to get up before this audience, and give my opinion of the exact change in an anatomical specimen about which I did not know

anything beyond post-mortem evidence. Without previous knowledge of the individual, this would be impossible.

I shall give a brief description of the appliance I use, in answer to Dr. Hofheinz' question:

Bands upon the canines and molars are connected upon each side by stiff bars. To these a plain, straight jackscrew is soldered firmly at the point of greatest constriction, and this produces pressure across the palate. Between the connecting bars and the teeth, I press in as much cement as possible, in order to make the support as rigid as it can be made. The jackscrew is turned until the pressure is felt, then, after a few minutes, it is turned again, until the patient feels the pressure more constantly; this is done twice daily at home. In this manner, I usually secure sufficient pressure in the course of four or five days to produce a noticeable separation between the central incisors; sometimes it takes seven days and sometimes two weeks, the rapidity depending on the individual. When the teeth are separated sufficiently, the patient is referred to a rhinologist for examination and, if he reports the nose widened sufficiently the appliance is left in position, sometimes for two weeks before it is taken off, and a retainer is placed in, on account of the tendency of the bones to spring back immediately if set free too soon. When the appliance is removed, a rubber plate is made to fit the sides of the teeth. As to the change in the nose, the only accurate evidence, outside of observation of the patient's expression as reported, and the reports of the rhinologists, is a series of measurements made by Dr. Dean, who devised an apparatus for intranasal measurement that is very simple and effective. Dr. Dean found that nasal enlargement continued some time after we ceased to bring pressure to bear across the palate, in the case of a young girl of seventeen. His records as published show that there was a tendency to increase. In other words, the yielding of the upper bones continued as a result of the pressure below. So far as retention is concerned, I have had no trouble with the bones returning. There are so many other agents that come into play when once we get nasal breathing, that there appears to be little or no fear of their returning.

Dr. Ferris. Are those upper molars carried in buccal occlusion with the lower jaw?

Dr. Brown. Occasionally the upper molars are carried completely outside of the lower teeth; sometimes only the buccal occlusion is increased.

Dr. Ferris. Would that not tend to return the teeth for the time being?

Dr. Brown. I would not leave them that way; I am not advocating anything of that kind. The patient is told to keep wearing some sort of retention appliance as long as there is a tendency to return to previous conditions; how long this may be, depends on the individual and the occlusion.

As to radiographs taken before and after these operations, I have with me a number of slides showing these cases before and after operation, but because of the length of the paper and the large number of slides, I decided to leave out some of them, but they will be published, and, if the matter is of sufficient interest, I would be glad to show the slides. It appears to me that anyone who looks at some of these slides, which show the centrals spread apart and a distinct separation between the maxillary bones, must know that these bones were not that way before anything was done to the mouth. It would seem that everybody might understand that a radiograph taken before the operation would give an appearance in the region of the median palatine suture such as is plainly evident in these slides.

Dr. Kemple. I do not agree with Dr. Brown there. I have seen a number of radiographs where no artificial movement of the teeth has ever been attempted, that showed a decided light line, apparently through the median suture.

Dr. Brown. With the central incisors apart that way?

Dr. Kemple. In some cases they are apart and in some together; and where there was a light line just as pronounced

as it apparently would have been if the suture had been absolutely open. It seems to me that we have an opening of the premaxillary suture, but I question the possibility of opening the main maxillary suture. I do not, however, attach any particular importance to that point. It does not make any difference whether it is opened or whether it is not; if you get the improved condition, that is all you are after. But I do not believe that radiographs are convincing evidence that you have opened the maxillary suture.

Dr. Brown. Dr. Cryer's suggestion with regard to the action of the tongue that has been referred to, is undoubtedly important. There can be no question of the possibility of its being an influential factor, but I am satisfied that the evidence presented here tonight points to many other influences that are active in these cases, and that cannot be ignored. Certainly the results obtained in dogs have an obvious bearing in this respect.

Dr. Kemple. In fact, I think Dr. Dewey experimented with monkeys also, and he is carrying his experiments over the present year and expects to report at the meeting of the American Society of Orthodontists in July.

Dr. Brown. In answer to Dr. Dunning, I did not think that I left the impression that I stimulated the tissues in cases of acromegaly. I showed the case of acromegaly to prove the existence of some underlying factor in development which was vital, and the likelihood of its influence lying in the pituitary or in the associated ductless glands, and I showed the great similarity between the tendency to certain anatomical defects in the cases that he had under treatment and those which are practically hopeless—that was the idea. I would not for a moment leave the impression that I was undertaking to treat acromegaly by spreading the maxillary suture. As to the change in shape or the effect of pressure on the sella turcica, and more particularly the foramina at the base of the skull, anyone who examines the skull of a newborn child, and notes that these tissues are almost cartilaginous at that time, must appreciate that the form of the foramina through which important vessels and nerves must pass could readily be affected. When they are once formed, however, and bone development is complete, their form cannot be changed.

As to the question of the slow or rapid maxillary expansion, it seems advisable for me to state clearly that I have a profound respect for the great good the orthodontists are accomplishing. It is just possible that I value it even more than the orthodontists themselves, because the nature of my surgical work has led me to look a little farther in search of its beneficial effects; but I do not believe that any operator is warranted in taking a year, or two years perhaps, or at least a long period of time, to bring about the proper relief in the case now under consideration, if it can be secured more promptly. If orthodontists could see the necessity for immediate relief as those who are treating pathological, nasal, pneumonic, and nervous conditions are obliged to view it, I am sure they would make every endeavor to secure as much movement as possible. The vital consideration, after all, is not whether we are spreading the maxillary suture, or the palatal suture, or the intermaxillary suture as mentioned by some. We do not care what happens in this respect; it is what we accomplish in giving relief from pathologic conditions that is important—it is the *result*. Whether the orthodontists accept this method, whether they believe that the median maxillary suture is opened or not, the physicians who are treating these patients realize the great necessity for promptly relieving the pathologic affections of the nasal cavity and of the sinuses, because they know the result of troubles in these sinuses upon the lungs and bronchi. It is well known that the sinuses form breeding-places for the pneumococci. Since other pathogenic bacteria are present, these individuals always exhibit a tendency to recurrence of disease and infection from the sinuses, and are much more subject to infection in the bronchial region than others whose mouths and noses are normally developed. These

bacteria live in the environment that the sinuses offer, and at the first opportunity of lowered resistance another infection occurs. It is therefore not for you to say whether the time required for maxillary expansion shall be one year or two years, if you can do it in two weeks, because the time element is often important. Nose-and-throat men are finding out that nasal relief can be given in a short time, and if the orthodontist will not do it, they will send their patients to the ordinary dentist and have it done.

With regard to the matter of occlusion, I do not think that anyone who knows me will question for a moment that I give proper consideration to the matter of occlusion. My contention is that by the method I advocate, we accomplish what the men who are dealing with these pathological conditions know must be done, and must be done as quickly as we can do it, and then is the proper time for the orthodontist to take hold of the case and establish as perfect occlusion as possible; the more perfect the occlusion, the more perfect will be the beneficial results obtained for the patient. The only difference between the orthodontist and myself is that I believe this result which we obtain to be more vital, and the first to be obtained in order to afford relief. Much as I respect occlusion, it is less important to my mind than the mental, physical, and nervous condition of the patient, and I would not hesitate to sacrifice occlusion for some of these benefits, just as the surgeon sacrifices a leg or an arm to save the patient. But fortunately we do not have to take such heroic measures, because we can spread the suture, and then have the orthodontist render the occlusion perfect by his routine methods.

The society then adjourned until the next annual session.

TORONTO DENTAL SOCIETY.

November 1913 Monthly Meeting.

The regular monthly meeting of the Toronto Dental Society was called to order by the president, Dr. Walter E. Willmott, Saturday evening, November 29, 1913, at 8 o'clock. A number of invited guests, members of the local Academy of Medicine, were present.

The President introduced as the speaker of the evening, Dr. Edward C. Kirk, Philadelphia, Pa., who read a paper entitled "A Reconsideration of the Etiology of Dental Caries, and a New Theory of Caries Susceptibility."

[This paper was printed in full at page 1 of the January issue of the Dental Cosmos.]

Discussion.

Dr. Harold Clark. It may not be out of place for me to explain why we have been honored tonight with the most interesting and scholarly paper that Dr. Kirk has just read to us.

A little over two years ago, a few of us here had the pleasure of having Dr. Kirk dine with us one evening. During the conversation, being all dentists, "shop talk" was inevitable. Our guest was led into the field of original research, and he told us many things of interest, particularly in the matter of diet and its probable relations to dental caries and oral sepsis. Some time after, I made bold to write Dr. Kirk and tell him some of my own observations and ask him some further questions. I also asked him if he might be prevailed upon to come and read us a paper elaborating with further detail the interesting subject that had been touched upon lightly

at the dinner. Knowing, as you all do, how busy a worker Dr. Kirk is, you can understand my surprise and pleasure when he replied that, out of loyalty to his scientific and professional standards, he did not see how he could decline the invitation. And so, gentlemen, he is with us tonight, and I know that we all appreciate his presence and his most excellent paper, as nothing less than a very great kindness.

As for opening the discussion of this paper, I was a very bad choice for the task. While it deals in some measure with the diet factor in the etiology of caries, it soars into the regions of physiological chemistry and the physiology of the brain—regions with which I have barely enough acquaintance to follow the argument intelligently, and far too little to discuss it along those lines. I am pleased to see Professor McCallum with us, as we all know that he is something of an intellectual aviator himself. This is a paper that should be specially interesting to the college man, and I am glad we have a few of them here to consider the subject and discuss it from that aspect. However, there are some points that I, as a practicing dentist, would like to enlarge upon, and at Dr. Kirk's suggestion I will cite some cases from my own clinical experience.

Our everyday work as dentists is of great value to the community. All propaganda teaching the prophylactic care of the teeth is good. It is always good, and good for all; but it is like the little hero of Haarlem holding his finger to the leak in the dyke, and no one coming to stop the leak. Assuming the validity of Dr. Kirk's contentions, which are so ably backed up by Pickerill and others, it looks as if we may have the matter of caries susceptibility within our control. Here will be a new gospel which will so enlighten poor civilized man that he may be able to rival the savages of the South Sea Islands in the health of his mouth and in his general health. It will be up to the dentist to spread that gospel. Recently Sir William Osler has come forward with another sweeping statement, viz, that the next great thing in the matter of public health is coming from the dentist; and the statement does not seem to have met with the criticism called forth by other historical assertions he has made. I wondered who could have told him, and then I remembered that he and Dr. Kirk had been college associates, and that Dr. Kirk had recently been in Oxford. So I had strong suspicions that it was he who had put the great physician wise to what the dental profession holds in its hand today.

Dr. Kirk, at the dinner referred to, suggested the probability that the over-ingestion of carbohydrates is responsible for a return of that class of food to the mouth by way of the circulation in a digested or soluble form resembling glycogen, and that this element in the saliva rendered it a very fertile culture medium for the proliferation of pathogenic germs in the mouth, the resulting presence of lactic acid supplying the conditions that, probably, account for the decay of teeth.

From my own clinical experience, I think we may clear the ground and go a step farther, and make sugar the main culprit, with starch as an accessory. Sugar, *i.e.* commercial sugar, is as artificial a product as morphin or strychnin or cocain. It is an element or part of a vegetable substance separated or freed from all the rest of that vegetable substance. And just as each of the alkaloids referred to makes a characteristic impression on the person using it, so also does sugar express itself in a characteristic way, and it is my impression that this characteristic may have an important bearing on the problem before us. Sugar has this peculiarity; it is so attractive to the human palate that it is eaten 'way beyond the promptings of hunger, if inclination be followed. And, likewise, foods made rich with sugar are taken far beyond the hunger limit. By way of illustration: After eating a meal of good plain food that satisfies hunger, we all know how easy it is to go on and eat sweetmeats or a sweetened pudding. If, instead of sweetmeats or the sweet pudding, properly boiled rice made palatable with salt and some spice, like curry, were substituted, there would probaby be no inclination to eat it.

The inference to be drawn from the above is obvious. Without sugar, hunger would probably determine for us the proper amount of carbohydrate food for our needs. Or, taking the converse, with sugar there will probably be over-ingestion of carbohydrates, the surplus finding its way back to the mouth, fertilizing and multiplying the lactic-acid-producing germs, until the alkalinity of the saliva is overcome and the mouth becomes acid. If any unconverted starch débris remain in the mouth, the free acid destroys the action of the ptyalin and prevents its being converted, leaving it to fasten itself to protected and susceptible surfaces of the teeth, thereby establishing foci of decay. And if a soluble carbohydrate in the circulation finds its way into the saliva, it surely is most reasonable to look for it in the moisture of the dentin, which is derived from the circulation in the pulp.

My experience in a clinical way has led me to the conviction that sugar, far more than starches, must be the really responsible factor of carbohydrate food in caries susceptibility. For years I have inquired into the diets of patients, especially those exhibiting the extremes of immunity and susceptibility, and long before I heard Dr. Kirk enunciate the theory that susceptibility was mainly due to the presence of a soluble carbohydrate in the oral fluids derived from the circulation, I was convinced that the baneful action of sugar occurred in some way after ingestion. For it is practically impossible to retain sugar in the mouth long enough for fermentation to take place. My idea was that it probably returned in some *obscure* way in the saliva, but the statements of Dr. Kirk at that dinner two years ago, the facts and probable facts set forth in his paper tonight, the investigations and conclusions of such men as Pickerill, Wallace, and others, make it very much less obscure. The teachings of these men, backed up by my own clinical observations, convince me that we are probably on the threshold of such knowledge as will put the matter of caries susceptibility under voluntary control in all but certain pathological cases. It will then become a matter of educational propaganda; and it does not require a very vivid imagination to see enormous possibilities for the well-being of civilized humanity, and to understand Osler's statement that the next great thing in the matter of public health is coming from the dentist.

A few days ago I received a letter from Dr. Kirk in reference to the paper he has just read and the discussion of it, and he suggested that he would be interested in the recital of any cases having a bearing on caries susceptibility. I shall refer briefly to a few.

Case 1. I will commence with my own. My grandfather was a large producer of maple sugar and syrup, and in our family during my boyhood these delectables and all good things made from them were enjoyed simply *ad lib.* Before I was twenty, my dentist told me that before I was thirty I would be wearing plates. That misfortune, thanks to much dentistry and faithful prophylaxis, has been escaped. But, until my convictions as a dentist led me to cut down my sugar consumption, I had an annual average of about five or six spots of caries on my teeth. During the last six or eight years, I have not had any caries whatever. Broadly speaking, my susceptibility to caries has been in the direct ratio of my sugar consumption. It would take some direct and convincing evidence to make me believe that my present immunity is simply due to the fact that I am passing through one of the much talked-of "immune periods" of my life.

Case 2. The next case is that of my own children. Not only had their father carious teeth during his childhood, but their mother was likewise unfortunate. If heredity plays any important part in susceptibility, my children should have no chance of escape, but as a matter of fact they are practically immune. I am quite within the mark, however, when I say that their sugar consumption is not ten per cent. of what their father's was; and, parenthetically, their general health in the matter of colds, stomach disorders, etc., is about as near the ideal as one could wish.

Case 3. This case concerns a young man of about thirty-five years. His appearance would suggest better than average general health. An experienced dentist would expect to find him the possessor of at least a fairly healthy mouth, and not more than the average evidence of caries. Instead, I found quite the most appalling condition I ever saw behind any man's lips. He had practically all his teeth, but scarcely any were free from caries. Some of them had whole surfaces so carious that it was impossible to shape the affected part into a cavity. I immediately put him through a catechism as to his diet. Had he been a young woman, I should have begun with the candy-box. His diet, *i.e.* his table diet, was at least usual if not normal, and offered no explanation. I asked him his business; he was a confectioner. I asked if he ever tasted his wares; he replied that he was eating them all the time by way of testing the output. The inference is obvious.

Case 4. A friend of mine asked me to look at the mouth of his new office-boy, whose teeth, he said, were very bad. He was a lad of fifteen, and when I examined him, I found twenty-eight as perfect teeth as I ever expect to see, but they had an unusual display of a blackish-brown tartar or stain in all the interproximal spaces. It was this stain that led his employer into thinking that the teeth were decayed. I inquired into his diet. There was an unusual absence of sugar in it, but far too much proteid food. Meat and cheese figured largely in all his meals. Otherwise his bill of fare was very plain. Perhaps Dr. Kirk could tell us if the proteid food and the unusual stain on the teeth bore any relation of cause and effect.

Case 5. This case concerns another young man of about thirty-five years. For about ten years I had cared for his teeth, and they were above average in regard to immunity. After about a year's absence from my care, he returned and complained of either cavities at the necks of his teeth or else hard tartar, as he could catch his finger-nail in them. I found his molars and bicuspids on the left side almost girdled with narrow bands of decay at the gingival margins. The right side was much less affected for some reason. I inquired about his diet and asked if he had been ill, or taking strong medicine. Nothing seemed to explain the unusual condition. He asked me if giving up smoking could be the cause. While I was explaining that it would probably make no difference in the matter, a sudden thought came to him. "Could it be this?" he said, pulling out of his pocket a small box with little confections in it, and he explained that ever since he had given up smoking over a year previous, he had kept one or two of these in his mouth whenever he had the inclination to smoke, and usually went to sleep with two or three in his mouth. I asked him if he had a habit of sleeping on one particular side and he said that he always lay on his left side. This fact may or may not have had anything to do with the trouble being almost confined to that side, but it was at least interesting to note it. I have little doubt that his confectionery substitute for the pipe was the cause of his trouble.

Case 6. Another interesting case was that of an old man who died recently at the age of eighty-four years. I cared for his teeth during about the last twelve years of his life. When I commenced to work for him, he had an unusually good lot of teeth for a man of his years. For six or seven years I had little to do for them. At about his eightieth year his teeth began to trouble him, and me too. His mouth had become very unclean, and his breath had acquired a very offensive and sweetish odor. He also seemed to have developed some pharyngeal or laryngeal irritation, for he was constantly clearing his throat and keeping up a small cough. I was attributing it all to senility, and was simply doing what I could to make him comfortable. One day, as he was getting into the chair, he removed from his mouth a small confection composed of sugar, licorice, and other things. I made inquiries about them, and learned that for a year or more he had kept one of these almost constantly in his mouth to allay the irritation that made him cough. I have

no doubt now that, in an indirect way, they greatly aggravated the irritation.

Case 7. A man of about forty-eight years, after years of unusual immunity to caries and considerable susceptibility to pyorrhea, suddenly exhibited several carious teeth. I began to probe for sugar in his diet. He confidently told me that I would have to guess again, as he was not fond of sugar and left the candies to the ladies. I inquired more intimately and ran over the list of possible sources of sugar—jams, marmalade, syrup, honey, etc. As soon as I mentioned honey, his wife, who was standing by, exclaimed, "Honey? Why, George just lives on honey!" He had a year or more previously discovered something special in the honey line, and, being fond of it, had been eating large quantities.

Case 8. This case is of a type that interests me most of all, viz, one of those young people with carious teeth whom we can interest enough in their teeth to make them eager to follow faithfully and continuously the diet and regimen we lay down and give us opportunity to observe results. The one case of this type that I will cite was a young growing girl of sixteen years. She came to me with an aching tooth. I cared for it, and pointed out that she had about a dozen other cavities that needed attention. There was ample evidence that she had had much experience in the dental chair before she came to mine. Inquiry into her diet revealed the fact that she and her mother specialized in homemade candy, of which she was very fond, and she confessed to a liberal use of sugar and sweet things generally at the table. On her next visit her father accompanied her. He explained that four months previously her teeth had been filled and made all right, and he had paid a bill of forty dollars. He told of his limited means, and that, in consequence, he could not afford such expense, and wanted to have me remove the affected teeth. I explained that that was impossible, but that, if he and his daughter would undertake to carry out faithfully the diet I would prescribe for her, I would undertake that in six months there would be very little to do, and that in another six months there would be less. I had ample confidence in the spirit of the girl to do her part. It is nearly two years since I first saw the girl, and after the first seven months I found two small cavities. I have seen her twice since then, and there has been nothing to do either time. I may add that there is a marked improvement in her appearance of health and well-being. But perhaps she has just entered a period of good looks as well as a period of immunity, and diet had nothing to do with it!

I shall trespass upon your patience with but one more case. It illustrates a point that has been interesting me for some time, and I trust it is not irrelevant to the subject before us. Pickerill, in his well-known book, "Prevention of Dental Caries and Oral Sepsis," discusses the diets of immune races, and it must have occurred to those who have read the work that the most immune races indulge in the use of what he calls "masticatories"—a much nicer term than chewing-gums, and it no doubt would remove much of the objection to their use! By way of giving my little five-year-old daughter supplemental mastication to develop the alveolar tissues, I gave her tamarac gum to chew for fifteen or twenty minutes after meals. I experimented with it myself, and observed the profuse secretion of saliva during mastication. I tested the saliva induced in this way, and found it always very alkaline, even though the mouth were acid before using it. I noticed that it left the mouth very clean, and assumed that the diastatic action of the saliva secreted had converted the soluble starch débris into the soluble dextrose, and that I had swallowed it. I have been prescribing it for those cases that we all so well know where the teeth are coated with a substance resembling half-boiled starch. The results, so far as I have been able to make observations, encourage me to think the practice may be of value.

Case 9. The case I wish to speak of specially in this regard is that of a young man whose teeth are always more

or less in this condition. He presented the other evening, just before I was leaving my office. I noticed that his teeth were badly coated, and as we were walking home together I saw an opportunity of making an observation. I had him chew this tamarac gum during the time we were walking—perhaps twenty-five minutes. I had him step into my house, and I examined his mouth. There was scarcely a trace left. Of course, it is obvious that the use of a masticatory leaves no débris behind it; and the act of chewing tends to remove the débris of previous mastication both mechanically and chemically.

The notion of "after-dinner" gum-chewing gives one something of a shock; but may there not be some prejudice involved? I can believe that there are those present who could be convinced that it should be quite as elegant as after-dinner smoking!

Prof. A. B. McCallum. The subject discussed in Dr. Kirk's address is a very difficult one. There are so many factors involved in the causation of dental caries that it is not possible to be comprehensive in a discussion of all the points involved. Dr. Kirk has, however, drawn attention in a striking way to one point of view which will cause those who are fixed in their ideas as to the origin of dental caries to re-orient themselves, and for that very reason his contribution is very valuable.

His suggestion that the causation is the production by bacteria of lactic acid from carbohydrates in the mouth may, perhaps, be accepted so far as one phase of caries is concerned. It is not, however, the only cause, for there are others which are more fundamental than that. There is the factor which diet develops. There has never been any doubt that diet does affect the teeth, and in this connection we have some evidence derived from the analysis made by Gassmann of the teeth of prehistoric man and of the teeth of man of the present day. It has been found that prehistoric human teeth contained more calcium and less magnesium than the teeth of the human subject of the present day. That alone postulates that our teeth are softer, much more friable, more easily disintegrable, than were the teeth of our very remote ancestors, and the only explanation possible for this difference is that the diet was different, and we know that it was.

It has been pointed out by German military physicians that the recruits from districts in which the drinking waters are charged with calcarious salts, as a rule have very good teeth. This observation is, perhaps, not quite satisfactory in all respects, because the waters of Salzkammergut, that is the district adjacent to Salzburg, are loaded with calcarious salts, yet the inhabitants of the region are markedly prone to dental caries.

In any consideration of this subject, we would have to group the factors in two classes: (1) Those which operate within the teeth; (2) those that affect caries from without. Of all those factors that operate within the teeth, the chief ones are due to disturbances in the general metabolism which tend to affect the nutrition of the different tissues. It is generally accepted that the poorly nourished individual in young life exhibits a tendency to develop dental caries. This involves the metabolism of carbohydrates, which has been emphasized by Dr. Harold Clark.

It is quite possible that an abnormal quantity of carbohydrates in the blood may disturb the composition of the teeth, either directly or through derangement of the biochemical processes of the tissues generally, thus disturbing the balance on which the interplay of the tissues depends for their normal development. That such disturbances of the balance may result seems to be indicated by what one finds in diabetes mellitus. In this disease the teeth manifest a decided tendency to caries.

Then there are the effects of certain lesions of the hypophysis cerebri which have been referred to by Dr. Kirk, but the most striking illustration of the dependence of the normal condition of the teeth on tissue metabolism is furnished by the removal of the parathyroids. When these are removed in an animal, the first symptoms are those of tremor or weak-

ness. The animal cannot stand, owing to the irregular contractions that occur in the muscles of the body, a condition which has been named tetany. The animal, as a rule, does not live long after the removal of these organs, but rats can be kept alive for from six weeks to two months after the operation. During this time there is a marked loss of hair. There is also eczema, but above all a marked decay of the teeth. Opaque white spots develop in the enamel, which then, at these points, becomes carious. These increase in number, the parts affected dissolve away, the teeth break off very freely, and death may occur simply from the fact that the animal is unable to take its food, because of its inability in this respect. It is evident that the internal secretion of the parathyroids influences, in some way at present unknown to us, the metabolic processes on which the normal nutrition of the teeth depends.

In pregnancy the metabolism is altered; how far, at present we do not know, but the internal secretions are involved, and of course this may account for the caries of pregnancy.

Among the external factors determining caries is the constitution of the saliva itself. Jonas has determined that normal saliva is saturated with calcium phosphate and magnesia, and therefore it cannot dissolve these salts from the enamel, but when the saliva is not saturated with calcium salt there is a tendency for the calcium phosphate in the enamel to dissolve. In the days when the cotton spinners had to moisten the cotton, as it was being spun, with saliva, the latter ultimately became very dilute, and dental caries was common amongst the operatives.

Then there is the lactic-acid-producing bacterium whose action Dr. Kirk has discussed. It does not seem to rely wholly upon the presence of carbohydrates as a source for lactic acid. Certain forms of lactic acid are derived from other sources than the carbohydrates. Propionic acid may be one of these, and we know that in the tissues propionic acid occurs as amino-propionic acid, ultimately derived from the digestion of proteins in the intestine. Of course the bacteria will produce lactic acid from carbohydrate, if it be present in the saliva, but the quantity of such a carbohydrate accessible to the bacteria in the carious spots cannot suffice to produce enough acid to dissolve out, except very slowly, the lime from the enamel and dentin. On the other hand, mucin which has a carbohydrate atom-group in its molecules, may very well serve as a source for the lactic acid that dissolves the enamel in the carious spot. I recall that some observer, whose name I have forgotten, has succeeded in cultivating *B. aerogenes lactis* in a carbohydrate-free medium, but containing mucin, with the result that lactic acid was formed.

W. H. Doherty, D.D.S., directed attention to the possibility of exophthalmic goiter having some influence on the susceptibility to caries.

A. McPhedren, M.D., said he was not prepared to discuss the subject so ably presented by Dr. Kirk. He believed the time had come when dentists should do research work, and be as well equipped as physicians. Dentists, he thought, should first obtain the M.D. degree, as do the eye, ear, and throat specialists, before beginning the practice of dentistry. He recognized the very intimate relation existing between the mouth and the general health, and thought good general health meant much better nourishment of the teeth and lessened decay. He hoped he might have an opportunity to study the essay carefully when printed.

Chas. J. C. O. Hastings, M.D., said he had been an *ex-officio* dentist ever since the establishment of the municipal clinic in Toronto. He believed that he had a staff of most capable and painstaking dentists in his department. The subject under discussion was a very difficult one, and one which he would not undertake to discuss; however, he felt there was a great work to be done in public health in the direction of the care and treatment of the mouths of the rising generation.

G. W. Ross, M.D., said that he had no immediate knowledge of the subject

presented by Dr. Kirk, but he had a fair knowledge of the relationship existing between diseases of the teeth and general health. He believed that properly cared-for mouths prolonged the life and happiness of the people.

C. S. Wright, M.D., said that he had had a good deal of experience in treating arthritic diseases in co-operation with dentists, and was of the opinion that the mouth was the source of infection in far over one-half of such cases.

A. H. Perfect, M.D., said that, in his experience as a surgeon, the mouths of patients suffering from goiter were usually in a bad state of repair, and that after operation there was a marked improvement of the condition of the mouth.

W. E. Struthers, M.D., said the oral hygiene movement had done a great work and would undoubtedly be a great factor in improving the health of the people. Too much may be expected from public health boards and public health education; nevertheless great benefit would result.

W. H. Peplar, M.D., congratulated the essayist upon the paper presented and the members of the Toronto Dental Society upon the privilege of hearing it. The Academy of Medicine might take this as an example. He believed, with Dr. McPhedren, that the dentist should graduate in medicine before beginning the study of dentistry. He believed it might yet be shown that the ductless glands had much to do with caries of the teeth. It was evident to him that the carbohydrate factor in diet had much to do with dental caries, but proteids were also a cause of acid production.

Chas. H. Waldron, D.D.S., said he had recognized serious caries of the teeth associated with catarrhal conditions of the throat and nose, and he believed enlarged tonsils and adenoids were in some way associated with the disease.

J. B. Willmott, D.D.S., said there was no doubt that diet had much to do with caries of the teeth in childhood, but had little influence in the adult. It was his opinion—formed over thirty-eight years ago—that a perfectly developed tooth did not decay, and he has had no reason up to the present time to change this opinion. There are many mouths hopelessly unclean with no caries, and others which seem to be splendidly kept but exhibit much caries. The difference is one of development.

The diet question comes in in this way: Perfect teeth can be developed only by perfect mastication. If children are taught to masticate their foods properly and are given only such foods as require vigorous chewing, a character of jaw, muscle, and tooth will be developed which will serve the remainder of their lives. The tendency of today is to give children soft sloppy foods, which are swallowed without mastication. Porridge and the modern breakfast foods are among the worst. The receding chins seen among our rising generations are due to this cause.

He was not at all sure, after long years of close observation, that women who had borne children had any worse teeth than those who had not.

A. E. Webster, D.D.S., M.D. The paper just read is a welcome one, because it directs our attention to a new field of research in connection with the cause of dental caries. Every close observer of decay of the human teeth has felt that Miller's theory did not tell the whole story. If the author's view be the correct one, there will be a justification for dentists inquiring carefully into the diet of their patients. Most dentists believe that diet influences susceptibility or immunity to dental caries. While Miller believed this, he held to the view that it was the fermentation of the carbohydrates as food in the mouth which caused dental decay. The author goes a long step farther and says that an excessive ingestion of carbohydrates causes an excess of these elements in the blood and in the saliva. If the saliva is loaded with a fermentable carbohydrate, germs acting upon this produce an acid which is the active agent concerned in the beginning of caries. The speaker can see little to criticize, but much to commend, in this view of the subject. It coincides with the history of dental caries in all races. Those races which eat largely hydrocarbons (fats), or

which live upon vegetables which require mastication, have little caries, while those races which live upon carbohydrates or soft pulpy foods have caries. The same races at different periods of their existence have had high and low incidence of caries, according to the amount and form of carbohydrates used. Pickerill says that caries of the teeth bears a direct relation to the amount of sugar eaten. Dentists who have followed the clinical history of caries of the teeth are convinced that diet is the most important factor, and that an excess of sugar is at the basis of our present unusual susceptibility.

The other cause of an excess of carbohydrate in the blood and in the secretions, besides an excessive ingestion, is given as a disturbance of the pituitary body. While there is little doubt that disturbances of this body cause an excessive amount of sugar in the blood and secretions, there is some doubt as to the accuracy of the deductions drawn from this fact.

The susceptibility of children and young adults to dental caries is explained on the theory that, because of the anatomical proximity of the origin of the fifth cranial nerves to the pituitary body, when the stress of dentition becomes pathological an excessive amount of carbohydrate appears in the saliva, hence caries. In this connection the clinical fact may be recalled that the greatest disturbance from dentition occurs during the first three years of child life, and this is the period of greatest immunity. Children's teeth rarely begin to decay before the fourth year.

Susceptibility to dental caries during pregnancy is explained by the disturbance of the pituitary body, which occurs at this time, causing an excess of sugar in the saliva. It would appear from the experiments quoted that there is an increased development of the pituitary body with each succeeding pregnancy. If the author's view be the correct one, there ought to be an increasing amount of caries with each succeeding pregnancy. This has not been the experience of the profession; in fact, the first pregnancy causes most caries.

As age advances, men who have been previously immune to caries often have an attack which seems to destroy the teeth more rapidly than in youth. These men often have diabetes, which causes sugar to appear in the secretions, hence caries.

The author aims to explain the penetration of bacteria into the tubules far beyond the source of food supply from the cavity, by the presence of carbohydrate in the tubules coming from the pulp. Is not the normal content of the tubule sufficient food supply for the bacteria present? Assuming the theory of caries presented to be correct, there ought to be a corresponding susceptibility to caries from the pulp end of the tubules with that from without; such being the case, caries which has penetrated the enamel should go directly toward the pulp, because of the presence of the fermentable element in the tubules. The fact is that this is the exception; in most cases of high susceptibility, caries spreading laterally rather than penetrating toward the pulp. Many first molars become denuded of their enamel by caries, and remain so for years without involvement of the pulp. It would seem as if there were a resistance from within to penetration, the more the teeth are decayed from without.

Many theories of the past on dental caries have led both dentists and the public into many errors. When it was shown that dental caries is caused by an acid, it was quite clear that all that was required was to make the mouth alkaline, and caries would stop. Then came the alkaline mouth-washes. These may have been of some value, but caries went on. Next came Miller, declaring bacteria to be a cause; then followed disinfecting mouth-washes. Caries still persisted. Dr. Smith with his doctrine of polishing the tooth surfaces followed next, and even those under his immediate supervision have some caries. None of the methods advocated has had any appreciable effect in lessening caries of the teeth in any nation. In spite of

all that has been done, there is more dental caries today than there was before these methods were recommended. While we may admit their value, we must at the same time look to the broader and more comprehensive means of saving the teeth of the great mass of the people. Something must be suggested which all can follow. All can follow a dietetic regimen, and if this prove to be the correct solution of the problem of dental caries, half the ills of man will be swept away. Dr. Kirk has pointed the way to a broader and more complete method of oral hygiene than that now practiced.

Dr. E. C. Kirk (closing the discussion). It has been a very great pleasure to me to have the opportunity of bringing to your notice what you will recognize as an extension of a presentation of the subject of dental caries that I had the pleasure of making to your society some two years ago; indeed, I may frankly say that it was the interest which you expressed in the topic at that time which stimulated me to a further investigation of the problem. So that, whatever of good or ill the paper may contain, I feel that because of your sympathetic interest in the subject I shall at least have the satisfaction of dividing with you the responsibility for the imposition that I have made tonight upon your time and good nature in listening to my lengthy communication.

The data presented by Dr. Clark from the clinical standpoint are particularly interesting and instructive. He has submitted an array of facts which are not only of the utmost importance in themselves, but they are of especial interest in their relationship to the hypothesis which constitutes the central feature of my paper.

I want to express my very deep appreciation of the thorough and intelligent discussion of the subject made by Professor McCallum. I hope he will not misunderstand me when I say that I never before have had the pleasure of meeting anyone who really knew so little about dental caries who was able to tell us so much about it—and by that I mean, one who knows so little about dental caries from the point of view of the dental practitioner; but he has presented the case from the point of view of the biologist and physiologist, and has done exactly what I hoped he would do, *i.e.* made it evident that dental caries is by no means the simple chemical or chemico-vital process which we have for a long time believed it to be. It seems to me that Professor McCallum has made it clear that dental caries has a definite constitutional relationship, that the varying composition of the secretions and of the body juices are factors dependent upon variations in the metabolic and the nutritional processes, and that these in their turn modify, if indeed they do not determine, the factors of susceptibility and immunity in relation to dental caries as they do in relation to susceptibility and immunity toward other types of bacterial invasion. I have for years been convinced of the belief that if we are to fully comprehend the causation of dental caries we must attack the question from the nutritional standpoint, and that we shall not be able to combat its ravages until we have clearly understood the influence which its constitutional relationship exerts upon the causation of this universal dental disorder. I am, therefore, especially grateful to Professor McCallum for his very suggestive presentation of the constitutional aspects of the problem.

I can only partially agree with Dr. McPhedren and Dr. Peplar, for, while I am in entire harmony with the view that dentists should do research work, and even that they should be medically educated, because of the very intimate relation now recognized as existing between the mouth and the general bodily health, I cannot agree with him when he contends that dentists should first obtain the M.D. degree. I object to that method of educating dentists, on two grounds: In the first place, it is my opinion that to make a dentist by first putting him through the medical curriculum and then attempting to build a specialized dental education upon the foundation of education which the medical curriculum furnishes is about the

worst possible way to make an efficient dental practitioner. I believe that the dentist should be medically educated in the broadest possible sense, and by that I mean that the curriculum should include all of the fundamental medical sciences necessary to a complete and thorough understanding of the human body, its composition, its mechanism, and its function in health and in disease, but I believe that the prospective dentist should obtain all of this education as a part of his dental training in a dental educational institution properly equipped for giving such training, and not in a medical school with a curriculum leading to the M.D. degree; which suggests my second objection to Dr. McPhedren's educational proposition, namely, that by the plan which I have proposed the dentist so educated is not so likely to become inoculated with the, shall I say, monopolistic attitude of mind with reference to medicine or medical knowledge which seems to be a fairly well marked characteristic of those who are holders of the M.D. degree—an attitude which I believe to be wrong in that it assumes that the M.D. degree is the mark of the endowment of its possessor with a knowledge of the whole range of medical science and art, whereas, as a matter of fact, it is simply the mark of having successfully pursued a special four years' curriculum of selected medical educational training.

Dr. Webster raises two or three points of criticism which it seems to me must have occurred to his mind because I failed to be sufficiently explicit with respect to the points which he has raised, rather than because they represent any real difference of opinion between us. He says, "It is a clinical fact that the greatest disturbance from dentition is during the first three years of child life, and this is the period of greatest immunity, children's teeth rarely beginning to decay before the fourth year." I am not at all ready to accept the general statement that the greatest disturbance from dentition is during the first three years of child life, excepting in a relative sense. The nervous reaction of a developing infant may be proportionately greater than the nervous reaction of a child or youth as its years increase; and, so far as I am aware, no data are at hand with respect to the developmental condition of the hypophysis cerebri as related to infancy, childhood, and adolescence. We can by no means regard the infant as simply a small-sized adult; the difference is not only one of size, but mainly one of relative anatomical development and corresponding functional activity. Therefore the function as well as the development of the nervous system in the infant must be taken into account in considering the relationship of dentitional stress in infancy to the reaction of all of the elements of the central nervous system, including also the reactions of the hypophysis cerebri to irritative influences. Neither am I prepared to accept the view expressed by Dr. Webster, that "Children's teeth rarely begin to decay before the fourth year." I have seen more than one instance of carious destruction of almost the entire deciduous denture at eighteen months of age. When we consider the continuousness of the dentitional process it is difficult to conceive of any period, from the time of eruption of the first deciduous teeth at about seven months of age up to and inclusive of the time when the third molars of the permanent denture come into normal position, when the individual may not be more or less subject to reflex irritations due to interferences with the dentitional process.

The observed increase in weight of the pituitary body coincident with successive pregnancies does not necessarily imply a correspondingly increased functional activity of the pituitary body with succeeding pregnancies, as the observed permanent increase in weight of the gland in connection with pregnancy is believed to be due to a hyperplasia of the inactive fibrous supporting tissue of the organ rather than to hypertrophy of its functionally active secreting cells, the so-called islets of Langerhans. I was not aware that it was the experience of the dental profession that first pregnancies caused the most decay, but the observation is interesting, if true, in that it would simply represent an additional

factor of increased susceptibility during the usual susceptible period—first pregnancies, broadly speaking, taking place in early life and before the normal period of the immunity of early middle life has been fully established.

Dr. Webster, in speaking of my reference to the direction of the progress of caries toward the pulp, asks, "Is not the normal content of the tubule sufficient food supply for the bacteria present?" and adds that, "Assuming the theory of caries presented to be correct, there ought to be a corresponding susceptibility to decay from the pulp end of the tubules with that from without, and that, such being the case, decay that had penetrated the enamel ought to go directly to the pulp because of the presence of the fermentable element in the tubules," but he believes the progression of the carious process directly toward the pulp to be the exception, because he says that, in most cases of high susceptibility, "The decay spreads laterally rather than penetrates the pulp." In answer to his first inquiry, I would say that the contents of the tubule would, in accordance with the theory presented, furnish a sufficient food supply for the bacteria present, and that the food supply is relatively increased in cases of susceptibility due to hypophyseal irritation owing to the relatively high sugar content of the blood plasma in such cases. This view, it seems to me, rehabilitates the early theory of dental caries presented by Underwood and Milles, and suggests that decay should ordinarily progress directly toward the pulp, and not laterally; but we must remember that the dentin is permeated in all directions by fibrils of living matter, the dentinal fibrils, as is well known, sending off thornlike processes which penetrate the basis substance between intervening tubules, the whole constituting a complete network of living matter throughout the basis substance of the dentin, for which reason decay may progress as readily in a lateral direction as toward the pulp—depending, of course, upon the histological distribution of the living matter in the dentin.

I am in harmonious accord with the emphasis which Dr. Webster places upon the dietetic aspect of the question, the importance of which has been so clearly pointed out by Dr. Clark and others in the discussion; but I believe, as indicated in my paper, that the adjustment of the dietetic factor must be with reference to the needs of the individual and not upon an arbitrary standard of calories or energy-producing power of the dietary. Some method must be devised whereby we can arrive at the varying standards of carbohydrate tolerance of the individuals under consideration, and the dietary should be adjusted in harmony therewith, if we are to keep within the limitations of safety in relation to the carbohydrate end of the dietary.

I hope it will be generally understood that in presenting this paper it has been with the purpose of bringing for your thoughtful consideration some data which to my mind not only have a very suggestive bearing upon the question of susceptibility to dental caries, but to point out what I think we must all acknowledge to be the fact, that our present conceptions of the etiology of dental caries do not sufficiently account for many of the clinical manifestations of that disorder. I desired above all things to avoid the appearance of dogmatism in the presentation of this subject, which I have put before you merely in a suggestive way and with the expectation of following it up later with a research which I trust will determine the correctness or otherwise of the doctrine which I have presented for your consideration. I again wish to thank all of the gentlemen who have taken part in the discussion for their cordial reception of my paper and the helpful suggestions which they have made in connection with this important question.

Adjourned.

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EDITORIAL DEPARTMENT.

THE STRIKE OF GERMAN DENTAL STUDENTS.

THE dental profession of Germany is, according to authentic reports, passing through a remarkable experience in the form of a general strike by the student body in all the dental departments of German universities, because of the decision of the Cultus Ministerium, on December 8th, not to grant to qualified and licensed dental practitioners the specific doctor title (Doctor Med. Dent.), which the dentists have formally demanded, and which, since the passage of the new dental examining and licensing law of 1909 they were assured would be allowed. Hence the entire dental student body of the German universities have refused to attend their classes as a practical protest against what they regard as the injustice of the decision adverse to their demand; and in making this protest they distinctly disclaim any dissatisfaction with or disrespect toward their teaching faculties, who, as a matter of fact, appear to be in sympathy with the student side of the case.

In support of the fairness of their contention and of their inherent right to a specific Doctor title as a mark of their qualification to practice dentistry, the students maintain that the grade of educational qualification demanded of them as a prerequisite for admission to the university course of instruction in dentistry is fully equal to that required for admission to other university courses—viz, the maturity certificate of the gymnasium; also that the graduates of the veterinary and the engineering courses are granted specific Doctor titles after periods of instruction no longer than that required of the dentist.

Heretofore those dentists qualified under the German law who desired to use the Doctor title have been compelled to acquire either the medical degree or the degree of Doctor of Philosophy—the latter having no direct relation to their special professional calling. The situation is further complicated by the coexistence of two grades or classes of dentally qualified practitioners under the German law—the first, Zahnaerzte, corresponding to Doctors of Dental Surgery in America, and Zahntechniker, corresponding to our dental mechanics or technicians who lack the qualification to practice dentistry as defined by our several state laws. As to the latter class, it appears that under the Imperial insurance law recently passed and now in effect in Germany, the Zahntechniker may receive a certificate of efficiency from the government which permits him to do dental work for insurance patients, which greatly lessens the legal difference between the regularly educated and qualified German practitioner and the dental mechanic of whom no educational training, preliminary or professional, is rerequired by law. The element of justice appears to be decidedly in favor of the demand of the dental students for the right to acquire the Doctor title as a distinctive mark of their special and legally required educational qualification to practice their profession.

What the outcome of the present agitation may be is not at present by any means clear, but the feature of especial interest about the case is the nature and source of the opposition to a demand which in its very essence appears to be perfectly just and proper. It is reported that the medical faculties are averse to granting a doctor's degree to dentists, especially if this degree is to be Doctor Med. Dent., the attitude being that it would reflect

unfavorably upon the dignity and importance of the medical degree, or might carry the implication to the public mind that the dental practitioner was a doctor in the same sense and degree that the holder of the medical qualification is a doctor. In short, the situation involves the old story of the effort of the medical qualification to protect itself against the encroachments of modern educational progress and arrogate to itself a monopoly of all knowledge comprised within the limits of the science and art of healing. Those conversant with the history of dental education in America, where systematic dental education had its birth, are familiar with the story of the struggle for existence that characterized the early life of the dental professional fledgling. As Prof. James Truman, in a notable address upon the occasion of the celebration of the "golden anniversary" of the discovery of nitrous oxid anesthesia, said, it was a repetition of the story of the "ugly duckling" that, "despised in its infancy, grew up later into a beautiful swan." The D.D.S. degree was ridiculed, its holders were spurned and excluded from association with medical men. Today the struggle is over, and dentistry receives all the recognition to which it is justly entitled. Its degree is respected for what it represents, and no one now hears aspersions cast upon the mark of the dental qualification—at any rate for the reason that it represents something which it is not.

But the very fact that the doctorate in dentistry has won for itself respectful consideration by all broad-minded thinkers and students of educational matters is evidence that the world has progressed in regard to this question as it has in all other ways—hence this reported attitude of medical opposition to a German dental doctorate degree savors somewhat of antiquity; more than that, of a certain lack of faith in the essential soundness of the foundations of the medical degree itself. Is it not a fairly debatable question, when the educational basis of the dental and medical degrees are under comparative consideration, to inquire whether the one is any more rightfully entitled to the doctorate designation than the other? We are rapidly approaching the point when, in the matter of time, scope of subjects, and thoroughness of training, the educational curriculum for the dentist will be the fair equivalent of that demanded for the attainment of the medical doctorate. Indeed the present dental requirement is now

larger and more exacting than that upon which the great leaders of medicine of a decade ago obtained their doctor's degrees; and, should the increased requirements in dentistry which now seem imminent be added to the curriculum, we shall be confronted with the anomalous spectacle of a specialty of the great healing art requiring as much and as thorough a training for its practice as is otherwise required for the legal practice of everything else in medicine outside of that specialty.

From the point of view here outlined it would seem futile upon the part of the medical authorities in any country to attempt to strengthen the weak places in their own professional position by placing legal obstacles in the way of the development of a thriving independent and rapidly growing specialty of the healing art; besides which, the time has long since passed when such a policy can be successfully maintained, for the simple reason that both precedent and public policy are against such a course. The rational course under the circumstances would seem to be to reorganize medical training in such a way as to train students for the various departments of medical practice by grounding them in the sciences that are fundamental to the whole field of medicine, and adding thereto the training necessary to their elected field of practice, and at the termination of such a course of preparation mark their qualification by a degree that would not deceive anybody by its implication that the holder was qualified to do anything or everything that the medical degree now under the law empowers the holder to do.

Death of Dr. J. N. Crouse.

As we go to press the sad intelligence reaches us of the death of Dr. J. N. Crouse (January 16th). An obituary notice with portrait will appear in our next issue.—Ed.

BIBLIOGRAPHICAL.

DENTAL RADIOLOGY. By FRANCIS LEROY SATTERLEE, Jr., A.M., D.Sc., Assist. Professor of Physics, Chemistry, and Metallurgy, Lecturer on Physics, Lecturer on Radiology, Director Practical Physics Laboratory, and of X-ray Laboratory, Chief of X-ray Section of Clinic, New York College of Dentistry. Pp. 197 pages. New York: Swenarton Stationery Co. Price, $3.00.

To start a book on such an important subject as dental radiology with an introductory chapter recommending X-ray work to the dental practitioner on the ground that, by so doing, he will save himself the "qualms of envy" toward his "much-hated rival, Blank, from across the street," is a procedure which, no matter from what angle it is viewed, must be condemned as unethical, especially when such a book is "primarily written for the undergraduate dental student." But even after we have tried to forget this commercialism—displayed also in the preface, in which are advertised five X-ray equipment companies—and look for scientific merit, we are disappointed. One incorrect statement follows another, and the many and wild mistakes can only do harm to the student, who, after he shall have familiarized himself in years to come with the science and technique of dental radiography, will find the fly-leaves inserted between the chapters very useful for corrections and additions.

The illustrative material is not good, and the considerably enlarged radiographs of practical cases will not help the beginner in correctly reading the film and diagnosing the case.

ELEMENTARY AND DENTAL RADIOGRAPHY. By HOWARD RILEY RAPER, D.D.S., Professor of Roentgenology, Operative Technic, Materia Medica, and Therapeutics, Indiana Dental College, Indianapolis, Past Dental Surgeon to Indiana School for Feeble-Minded Youth, Member Institute of Dental Pedagogics, and of local, state, and National dental societies; associate member A. M. A., Section of Stomatology. Pp. 317 and index; 354 illustrations. First edition. Adopted as a text-book by the National Association of Dental Faculties. New York: Consolidated Dental Mfg. Co. London: Claudius Ash, Sons & Co., Ltd., 1913. Price, $5.00.

This book, which has appeared seriatim in *Items of Interest,* evidently tends to fill a need in dental literature, viz, that of introducing the beginner into the complicated field of dental X-ray work, which is fraught with quite some risks, yet has become a necessity in diagnosis. With this aim in mind, the writer devotes the first portion of his book to "Elementary Radiography," with chapters on electricity, X-ray machines, X-ray tubes, and the X rays, but these, for the beginner, would be rather difficult to comprehend. Many important points are not explained with sufficient detail or clearness, while more attention than necessary is paid to details of minor importance. Many questionable assertions are made, and some that are essentially

incorrect. The bulk of the book, which is made up of chapters on the making and the interpretation of dental radiographs, with their uses, the dangers of the X ray, the purchasing of a radiograph outfit, and stereoscopic radiography, contains a number of mistakes which one who knows the subject well will recognize, and also considerable good by which he will profit; for the beginner, however, it is dangerous to depend upon such a text-book, which therefore cannot be recommended conscientiously. The illustrations are very good, although many of them are borrowed. If we may disregard the poorer qualities of the book, some useful suggestions may be obtained from the chapters on dental radiographic technique.

The English used is by no means above criticism. It may be an entirely personal matter of taste to affix membership in "local, state and National dental societies" to one's name; usually such membership is regarded as a professional duty, fulfilment of which is reserved for laudatory mention in an obituary notice. Neither is it customary to mention the fact that a new book represents the "first edition," even though strong hope is usually entertained by the writer and publishers that many more editions may follow, which, in the case of this volume, we trust will considerably be improved upon.

Glossary of Dental Terms. Compiled by the Commission on Nomenclature of the Institute of Dental Pedagogics. Presented at the meeting of the Institute held in Pittsburgh, Pa., January 28, 29, 30, 1913. (Commission: S. H. Guilford, A. W. Thornton, R. W. Bunting, *Sec'y.*)

Nomenclature has for a long time been the bugbear of dental writers and teachers, and any effort in the direction of bringing order into the more or less chaotic conditions still existing, with the aim of ultimately bringing about a standard terminology such as other sciences have long enjoyed, is to be heartily welcomed. In the present glossary there are many inconsistencies and faulty phonetic transcriptions, with not a few partly or wholly incorrect definitions. Unless the glossary is intended for circulation among foreign practitioners, it is superfluous to indicate by phonetization, to English-speaking dentists, how to pronounce such words as *angle, arch, base, clamp, clasp, crown,* etc. Moreover, the correct phonetic transcription of the word *angle* is not "an′-gl," but *ang′gl.* How useless the phonetic transcriptions "klamp," "klasp," "krown"! It is not the *c* that calls for transcription in *crown,* but the vowel *ow*—for the phonetic transcription of which a special symbol would have to be adopted and adhered to. And why omit to phoneticize such words as *analgesia, cantilever, diagnosticate,* which offer real difficulties in pronouncing? A great many inconsistencies occur in the markings of "longs" and "shorts" [for the convenience of the printer we represent these below in transcription by small capital and italic letters respectively], sonants and surds, accents, open and closed vowels, etc., to wit: "ab-nor-mal′-*i*-ti," but "ab-nor′-mi-tE," and again "as-sim′-e-tree," which is doubly wrong; "an-eel′" is faulty in taking *n* into the first syllable; the *a* with a mark of brevity [or, *a*] seems needed, thus "*a*-nEl′." The accent in *alveolo-dental* should be on the second, not the third syllable. In such words as *apex* and *foramen,* the plurals *apices* and *foramina* should be given; while we find under

apex the phonetic pronunciation, but not the regular spelling, of *apices*. *Alinement* does not only mean "the line to which adjustment is made," but also the adjusting to a given line. Why should *bite* be an "inelegant term"? It surely is no more so than *dummy,* for which the more definite term "pontic" is coming into use. This term is awkwardly described as "a suspended member of a dental bridge." The definition "a unit of a dental bridge, other than an abutment" would seem more accurate. Moreover, the term "pontic" should have been also mentioned and explained under the headings *dummy* and *bridge-work. Bridge* is listed as a verb only, and the impression created as if only "bridgework" were used as a noun.

These few suggestions are made merely to emphasize how necessary it is in such a task to adopt and adhere to a definite system, such as every lexicographer employs and any trained philologist is familiar with. The revision of this glossary by the present commission of dental practitioners—to whom great credit is due for the expenditure of time and energy which their work must have involved—will surely prove a grateful and meritorious task.

R. H. R.

PAMPHLETS RECEIVED.

"Fundamentos de Ortodoncia Racional." (Fundamentals of Rational Orthodontia.) By J. Valderrama. Reprinted from *La Odontología,* May 1913.

"La Semielipse del Maxilar." (The Semi-ellipse of the Maxilla.) By Dr. M. A. Weiss. Reprinted from *Revista Dental,* Havana, Cuba.

"Erfahrungen über Druckanästhesie des Dentins." (Experiences with Pressure Anesthesia in Dentin.) By Dr. H. Pichler. Reprinted from *Oesterreichische Zeitschrift für Stomatologie,* Vienna, No. 2, 1912.

"Praktische Winke zur Asepsis bei der Wurzelbehandlung." (Practical Hints Regarding Asepsis in Root-treatment.) By Dr. H. Pichler. Reprinted from *Oesterreichische Zeitschrift für Stomatologie,* Vienna, No. 2, 1913.

"Die Theoretische Grundlage des Andresenschen Präzisions-Artikulators." (The Theoretical Basis of the "Precision" Articulator of Andresen.) By V. Andresen, Copenhagen. Reprinted from *Zahnärztliche Orthopädie und Prothese,* May and June 1913.

"Ausschaltung der Nasenatmung beim Hunde." (Elimination of Nose-breathing in the Dog.) By Dr. R. Landsberger, Berlin. Reprinted from *Archiv für Anatomie und Physiologie,* 1913.

"Veränderung des Kreislaufs bei pulpatoten oder pulpalosen Zähnen." (Circulatory Change in Dead or Pulpless Teeth.) By Dr. R. Landsberger, Berlin. Reprinted from *Archiv für Anatomie und Physiologie,* 1913.

"Nagra Synpunkter i Fraga om Ledningsanestesien i Underkäken." (Some Considerations Regarding the Question of Conductive Anesthesia in the Mandible.) By Pehr Gadd, Helsingfors. Reprinted from *Finska Läkaresällskapets Handlingar,* No. 12, 1912.

"Ueber Ernährungsfragen in ihrer Beziehung zur Zahnheilkunde." (Problems of Nutrition in Their Relationship to Dentistry.) By Dr. H. Chr. Greve. Reprinted from *Correspondenz-blatt für Zahnärzte,* No. 3, 1913.

"Beiträge zum Stoffwechsel der Zähne." (Contributions to the Metabolism in Teeth.) By Dr. Feiler, Breslau. Reprinted from *Deutsche Monatsschrift für Zahnheilkunde,* No. 9, 1913.

"Sondenfüllungen für Zahnwurzelkanäle." (Sound Fillings for Root-Canals.) By Dr. Abraham, Berlin. Reprinted from *Deutsche Monatsschrift für Zahnheilkunde,* No. 7, 1913.

"Améliorations à la technique opératoire dentaire par l'usage de moteurs électriques à grande vitesse." (Improvement of Dental Operative Technique by the Use of High-speed Electric Motors.) By Emile Huet. Reprinted from *Journal Dentaire Belge,* July 1913.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, April 1913.]

GOUT AND PYORRHEA ALVEOLARIS. By Dr. Brubacher, Munich.

In the etiology of pyorrhea alveolaris, gout has been assigned an important rôle as a predisposing factor. Uric acid is supposed to be deposited in the peridental tissue, causing inflammation and preparing the ground for the invasion and growth of pyogenic bacteria. Arthritic diathesis has been emphasized as a cause of pyorrhea alveolaris, especially by American investigators. The fact, however, that a great many arthritics show no signs of pyorrhea has induced the writer to investigate the matter, by employing the murexid test upon superficial and deep deposits on extracted teeth of non-arthritics, arthritics, and patients suffering from arthritis deformans, as well as healthy persons. The murexid test, as every dental student knows, consists in adding to a small amount of the material to be examined a few drops of nitric acid on a porcelain dish, subjecting it to slow heat until dry, and allowing a drop of caustic ammonia to flow from the edge of the dish into the residue, whereupon a beautiful purple red is produced if uric acid is present. This test is an absolutely certain criterion for the presence of uric acid. If, however, albuminous substances are present in the substance to be tested, they may not only hide the purple red color of the murexid test by their yellow, orange-red, or red-brown coloration, viz, the xanthoproteic reaction, but may actually simulate that purple color. The controls made by the writer with the deposits collected from the teeth of healthy patients proved absolutely negative, but upon the addition of the slightest trace of uric acid, even in the presence of an abundance of proteids, the murexid test produced the characteristic purple. After these preliminary tests, twenty-five tests were made with deposits gathered from arthritics, all of which showed negative. Neither did patients with pyorrhea alveolaris show any prevalence of arthritis upon clinical examination. The writer is consequently of the opinion that American investigators who believe that they have demonstrated uric acid in these cases have confused the proteid reaction with the murexid test, which mistake may easily occur if the porcelain dish be heated too rapidly and a trifle too much ammonia is added. According to the writer's investigations, the deposition of uric acid locally predisposes the surrounding tissues to the invasion of bacteria and protozoa no more than does any other dyscrasia which reduces vital cell energy.

[*Proceedings of the Royal Society of Medicine*, London, May 1913.]

PROBLEMS RELATING TO THE TEETH OF THE EARLIER FORMS OF PREHISTORIC MAN. By Arthur Keith, F.R.S.

The recent finds of prehistoric skulls in England and France which have evoked such a liberal offering of conjecture and investigation, and which throw most significant light upon the age of the human race and the justification of the theory of evolution, have set numerous dental investigators busy making comparative studies of the teeth which have been found in these sparse remnants of earlier humanity, and which are of the utmost importance in determining the probable sex, age, and remoteness or proximity to a simian ancestor of the specimens found. One of the ablest of these writings is that of Keith, who makes an attempt to sketch the various features of a dentition which should guide us in estimating the degree of antiquity and the degree of primitiveness in any discovery of ancient or fossil man.

The teeth of the Neanderthal man, although primitive, or simian in some features, in others are highly specialized. They show the condition of thaurodontism beyond any other known form of man or ape, surviving or extinct. The condition of molars and canines described by the writer as plenal, supra-plenal and infra-plenal have also to be taken into account. These terms are derived from the consideration that in a primitive dentition the size of the molar crowns should increase from the first to the third. This physiological condition is well illustrated by comparing the dentitions of the gorilla and chimpanzee. Of the close structural and genetic relationship between these two anthropoids there can be no doubt. There is also no doubt of the close structural relationship between these anthropoids and man. Hence any observation on dentitions of those two anthropoids has a direct bearing on the problems relating to the evolution of man's dentition. The dentitions of the gorilla and chimpanzee are very different; they represent opposite stages of a process of tooth development for which we have no good term. In the gorilla the crowns of the lower molars increase from the first to the third; in the chimpanzee the last is usually the smallest of the series. In the upper molars the last is distinctly the smallest of the series in the chimpanzee, but in the gorilla it is but a little less than the first. The crowns, cusps, and roots of the gorilla's molars have a more robust development than in the chimpanzee. The molar length of the gorilla is 52 mm., in the chimpanzee 35 mm. We have every reason to suppose that the gorilla and chimpanzee dentitions are derived from a common form, the gorilla's representing a progressive and the chimpanzee's a retrogressive development from the common form. The term wanted is one to indicate these opposite phases of a common process. If the orang dentition be taken as representing a mean or plenal degree of development, then the gorilla's dentition represents a supra-plenal phase, and the chimpanzee's the infra-plenal phase.

The various plenal phases in the prehistoric skulls examined apparently represent the result of physiological processes, and are usually, but not necessarily, indications of antiquity and primitiveness. As regards the teeth of the Galley Hill mandible, they are essentially more simian or primitive than those of the Neanderthal man.

[*Province Dentaire*, Lyons, No. 5, 1913.]

HYPERTROPHY OF THE FRENUM LABII.

By Dr. J. Quintéro.

Hypertrophy of the frenum labii occurs more frequently in the upper than in the lower lip, but in both cases considerable disturbances are brought about, which are not always readily recognized as to their etiology. Frequently the upper frenum appears to be situated rather high on the gingivæ, which are thickened, but of normal color. This hypertrophic condition is a retarding element in orthodontic treatment, and must be removed surgically in order to bring about a correction of the diastema of the central incisors, which sometimes diverge from 4 to 5 mm., producing considerable facial disfigurement. This diastema at other times assumes the form of divergence of the roots with simultaneous overlapping of the crowns of the central incisors.

Correction of this hypertrophy of the frenum, which is frequently found in little children, consists in resection of all those portions of the frenum which are anatomically abnormal. The writer employs for this purpose an instrumentarium consisting of a very narrow bistoury such as is used by ophthalmologists, a pair of fine and pointed scissors, a pair of fine dissecting pliers, and a lamp for flaming the instruments. The operation is executed under local anesthesia with a solution of novocain 0.01 gm., adrenalin 0.001 gm., and distilled water 1 cc., the injection to be made slowly. The wound is cauterized after resection, and dressed antiseptically. This operation, which is not very simple, requires the greatest care; especially the thermo-cautery must be judiciously applied in order to prevent burning of the periosteum, which would produce a considerable loss of gingival tissue and exposure of the roots of the teeth. The operation can be made at any age; the optimum age, however, lies between the two dentitions, viz, after shedding of the deciduous centrals and before the eruption of the permanent ones—whereby the danger of excessive cauterization of the gingivæ is avoided. After the wound is completely healed, the central incisors are regulated and maintained by orthodontic measures.

[*Lancet*, London, September 6, 1913.]

THE TEETH OF SCHOOL CHILDREN IN AUSTRIA. (Correspondence.)

During the last few years, the problem of the teeth of the rising generation has received much attention in Austria, partly in the interest of the state, partly by the efforts of sociologists. A special society, having this question as its principal object, has been founded in Austria. This "Gesellschaft fuer Schul-Zahnpflege," has already erected a special dental clinic in one of the outlying districts of Vienna, and another clinic of a similar kind in Berndorf, one of Austria's largest manufacturing towns, where an institute in complete accordance with modern views provides the required medical or surgical help for suitable cases. In a paper published in the *Oesterreichisches Sanitaetswesen*, the official organ of the Health department of the Austrian Home Office, Dr. Wolf, who acts as the secretary of the above-mentioned society, has given a variety of reasons in support of the idea that the state has a great interest in this movement. He said that since a carious condition of the teeth was responsible for much suffering and for the diminution of the power of resistance against diseases, the health of the army was in a high degree dependent upon the hygienic condition of the soldier's mouth and teeth. In schools, a child suffering from toothache was unable to keep abreast of the teaching; it had to be absent from school frequently, its mental activity and perception were impaired, and, on the other hand, the odor from carious teeth, if emanating from numerous children, was a nuisance to the other pupils and the teachers. The cost of combating caries was comparatively very high, but the ethical effect of the hygienic measures adopted was also most valuable, since both parents and pupils were induced to pay more attention to the state of their general health when they saw how much care was taken to keep the teeth in order. At the same time, there was no other disease of equal prevalence which could be combated so easily and so effectively as caries of the teeth. The movement has been accepted by the Austrian public with great satisfaction. Even the dental profession is in favor of it, since the bulk of the cases treated in the dental school clinics would never have become patients of dentists in private practice, while also care is taken that children whose relatives are able to pay for dental service are sent to a private dental surgeon and not treated in the clinics.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, August to November 1913.]

STATISTICS ON DENTAL CARIES. By Dr. R. Kloeser, Marburg.

In the first chapter of this most painstaking and comprehensive paper, the writer gives an historical review of the publications on dental caries statistics that have heretofore appeared. The results of the examination of 519,318 German school children are given in sixteen tables, and the establishment of a central bureau of statistics is urged. The percentage of children suffering with dental caries is calculated to be 94.12 per cent., the average number of carious teeth being 7.19. Calculations as to the comparative distribution of caries in the two dentitions show that, of the above average number of carious teeth, four are of the deciduous, three of the permanent set, six belonging to the molar, one to the incisor class.

Examinations of 33,000 boys and as many girls proved that both sexes are alike in regard to susceptibility to caries, with the difference that girls show better deciduous, but worse permanent sets. The investigations of fourteen observers tend to show that the comparative frequency of caries in the upper and lower jaw is as 6.9 to 5.6, 552 of 1000 carious teeth being uppers, 448 lowers. Again, the ratio of distribution of caries in the various kinds of teeth is 396 upper and 420 lower molars and premolars and 155 upper and 29 lower anterior teeth per 1000.

The lowest frequency of caries is found during those periods in which the majority of teeth are developed, viz, at the ages of three, six, and twelve. Beyond the age of fifteen, however, the present statistics are too unreliable to permit of indisputable conclusions.

The writer then refutes some of the statements made by Röse, whose figures do not tally at all, thus detracting greatly from the merits of his investigations. The relationship between dental caries and development of the human organism is established beyond doubt, and can be proved by figures, deterio-

ration of the teeth involving loss of weight or lack of development. In a great many cases, nervous symptoms and eye and ear disease can be traced to dental troubles. In regard to the effects of caries upon mental efficiency, the author again attacks Röse, whose findings in this respect, together with those of American investigators, he stigmatizes as unscientific and not to be taken seriously. How very open to discussion this chaper is may be gathered from the findings of Wurfschmidt (see "Dental Diseases Among School Children and Their Effects upon Efficiency," DENTAL COSMOS, December 1913, p. 1292), whose methods seem no less scientific than those of Kloeser, and who has shown some very convincing statistics regarding this phase of the problem of caries. That the fitness for military service is directly influenced by dental conditions is not surprising, although in the writer's opinion it cannot be proved by numerical tables that, as Röse writes in his rather uncritical enthusiasm—"The better the teeth, the greater the body weight, the larger the chest, and the greater the fitness for military service." On the other hand, the general average of fitness for service is undoubtedly greatly raised by rational dental treatment during childhood and adolescence.

The most surprising feature of Kloeser's statistics is the finding that, despite the apparently universal spread of the oral hygiene movement throughout the empire, and the exemplary facilities for the dental treatment of German school children, of 51,778 children with carious teeth only 744, viz, 1.43 per cent., enjoy dental treatment, which means that only every seventieth child has done something toward the preservation of his teeth. Of 1,787,571 carious teeth only 9093, viz, 0.5 per cent., are filled, in other words, of 1000 carious teeth in school children, only five are filled. In an appendix comparative statistics are collected on the frequency of dental caries in adults and school children in German cities and rural districts, in Sweden, Norway, England, Scotland, Russia, Italy, Switzerland, Holland, Austria, Belgium, New Zealand, and Illinois. The bibliography contains no less than 206 references, the number of which could have been considerably increased, if the English and American publications had been given due consideration.

The present work is undoubtedly a most creditable one, and probably the most extensive that has so far been published on the subject of oral hygiene.

[*L'Odontologie*, Paris, November 15, 1913.]

BRIDGES ON VITAL ABUTMENTS WITH A MINIMUM OF MUTILATION. By L. RUPPE, PARIS.

Two difficulties frequently present in cases in which bridge work is indicated. The first of these is malposition of the abutment teeth, most often mesio-version or forward tilting of the second or third molars. These teeth can, however, be employed as abutments without devitalization by grinding off the mesio-approximal surface and mesial cusps and the greater portion of the distal cusp, rendering the sides of the abutment tooth almost parallel with those of the anterior abutment. The second difficulty frequently met with is hypersensitivity of the dentin. Devitalization in these cases will be the most convenient mode of procedure. In some cases, however, the following preparation will answer the purpose: With a round disk with a cutting edge of about 2 mm. thickness, a mesio-distal groove or cavity is cut in the center of the masticating surface of the abutment teeth. A plaster impression is taken, and a model of coarse investment compound is poured and articulated. The bridge is then modeled in casting wax, the abutment teeth to be surrounded with a ring of wax that will embrace the tooth about the middle of its crown, the mesio-distal inlay in the prepared groove to form the diameter of this ring. Owing to the thickness of these abutment rings, they are applicable only when the abutment teeth stand alone or at least not in close contact with an approximating tooth. If the approximating tooth is close to the abutment tooth, and no metal is to be shown for esthetic reasons, the central groove is enlarged and extended in a gingival direction on both the labial and distal surfaces, as in the preparation for Carmichael crowns. In this way a minimum of mutilation of the abutment teeth is insured, the peridental ligament is not impinged upon, and the abutments can easily be kept clean.

[*British Dental Journal*, London, May 15, and July 1, 1913.]

THAT TOOTH-BRUSH. (NEWS AND COMMENTS.)

THE SEPSIS OF THE TOOTH-BRUSH. BY W. PARKER HARRISON, BRIGHTON.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, September 1913.]

HYGIENE OF THE TOOTH-BRUSH. BY ZAHNARZT FUNCKE, WIESBADEN.

The tooth-brush, the implement of oral toilet, often regarded as the "herald of civilization," has for some time been an object of suspicion to bacteriologists. As it cannot be boiled with impunity, sterilizing arrangements have been suggested, as, for instance, tricresol or formalin, which imparts, however, a bad taste to the brush. Some sensation was caused in 1910 at the British Medical Association meeting by a joint paper in which Dr. Carmalt-Jones and Mr. Herbert Smale drew attention to the possibilities of a brush becoming almost a septic culture-ground. That the tooth-brush actually affords a culture medium is convincingly shown by Harrison, who emphasizes that not only the public, but even dentists themselves, have little conception of the filthy state of the apparently clean tooth-brush as used in everyday life. Both dentists and the laity take it for granted that the ablution received by the tooth-brush after use, either under the tap or in the tumbler, is quite sufficient to render it reasonably clean. That this assumption is entirely erroneous is shown by the following experiments: Each of twelve sterile tooth-brushes was used once, rinsed ten times in a tumbler of water, and after standing for twelve hours, all the bristles were removed with sterile forceps, and the organisms counted in the usual way. In eight out of the twelve cases more than a million organisms were found, a quantity which is comparable with the number of organisms found in sewage. In fact, in one-sixth of the counts made on sterile tooth-brushes, used once only, the number of bacteria on the brush exceeded the number found in sewage. The experiments were carried out in patients with and without oral disease, and four tests in apparently healthy mouths showed that almost as large a number of bacteria were left on the tooth-brush. How deplorable this state of affairs is, especially when septic processes are active in the mouth, needs no further emphasis. An attempt was also made by Harrison to determine whether four popular dentifrices deserved the encomiums bestowed on them by their advertisers or the strictures passed on antiseptic tooth preparations as a class by their opponents, and whether these preparations will cleanse the brush as well as the mouth. The results of a large series of most painstaking baceriological tests show that it is fair to conclude that a properly chosen antiseptic dentifrice is emphatically desirable for use, and will prove effective in affording a reasonable degree of cleanliness of the brush.

The means usually employed for keeping the tooth-brush free from dust, etc., at home and on journeys are considered as most impractical by Funcke. A really hygienic condition of the brush can only be obtained by leaving it after each use in 70 per cent. alcohol until the next use, which will keep the brush absolutely sterile. Unfortunately, most brushes will not tolerate the effect of the alcohol very long; either the handle deteriorates or the bristles fall out. For this reason, Funcke recommends making tooth-brush handles of hard rubber containing less sulfur than vulcanite. This material is slightly elastic and is not attacked by alcohol. This handle with the interchangeable brush is kept in an airtight bottle, the top of which may be so constructed as to be serviceable as a rinsing-glass to be used on journeys. The alcohol in the bottle should not be stronger than 70 per cent. and not weaker than 55 per cent., which means that it should be renewed every fortnight, assuming that the brush is being used three times daily. Alcoholic mouth-washes which contain not less than 60 or 70 per cent. alcohol may be used for the same purpose, while those consisting of aqueous solutions of hydrogen dioxid or formalin are unsuitable, as they are decomposed by the organic substances introduced in the brush, and soften and dissolve the bristles.

Hints, Queries, and Comments.

RULE FOR DETERMINING THE CORRECT OR FAULTY PROPORTIONS OF ANY PROFILE.

A STRAIGHT line is drawn from the brow M, passing through the base of the ala of the nose, F, to reach the lower border of the mandible, B. The distance is obtained with a pair of calipers from B to the chin, and the line B C is drawn; this measurement is carried over the line A B, placing one arm of the calipers in the forehead and the other in the line A B. Having determined the point A, the line A C is drawn, passing through the external nasal spine, H, to intersect the line C B, or its prolongation. Studying the angles D A C and D C B, or completing the parallelogram by drawing the line D B and the diagonal D C, we may determine, in the same manner as the parallelogram was obtained, the position of the first molar. The valuable data lie in the lines A B and C B, and the determination of the point A, or better, the angle D A C. I have studied this problem to a limited extent, but my equipment is very insufficient.

FIG. 1.

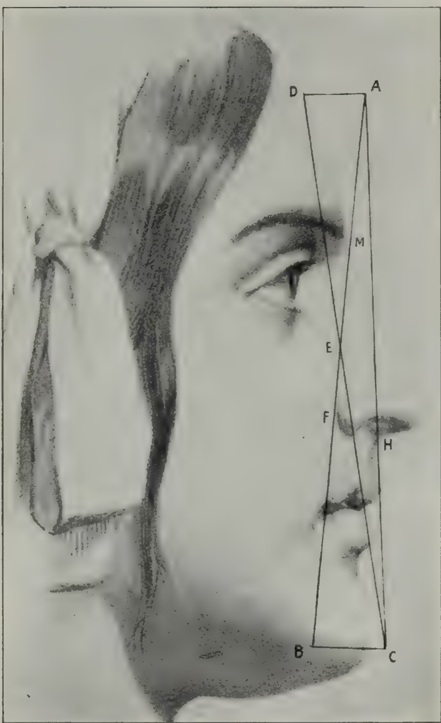
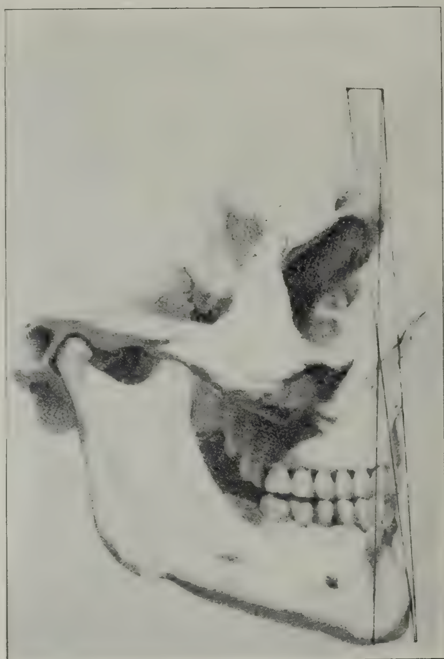


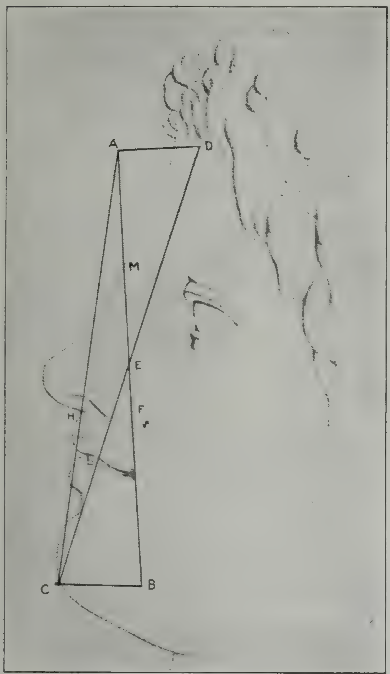
FIG. 2.



In cases like Fig. 13, page 16, in DENTAL COSMOS for 1905, the point A is situated in the brow, because the line A B does not intersect the mandible, so the line A C is to be traced from the brow just to the chin; then

the irregularity must be corrected, bringing the mandible forward until the line A C crosses it in such a way that the parallelogram can be traced.

FIG. 3.



lie in the prolongation; in no case must the line A D intersect the forehead, but must simply touch it.

In this way, the point A will be farther

FIG. 4.

In cases of marked prognathism, like that in Fig. 609, Angle's book, the distance C B measured off on the line A F, will not reach the forehead, nevertheless the line A D is to be traced to determine the point A. One arm of the calipers, therefore, is placed on the line A F, and, always keeping the parallelism with the line C B, the point D is marked, which in this case will not touch the forehead, but will away from the brow, and the inclination of the line A H C will be greater toward the face. Pictures illustrating these proportions will be found in DENTAL COSMOS, 1906, vol. xlvi, pages 377–88; also in 1905, vol. xlvii—see Figs. 4 and 6, page 1404, and Fig. 14, page 1410.

JOSÉ VALDERRAMA, D.D.S.

Madrid, Spain.

Periscope.

Dull Burs.—A wise dentist will not err on the side of undue economy in the use of burs. A dull bur does the minimum amount of work with the maximum amount of pain, is a time-waster, and a poor business-builder. —*Dental Brief.*

To Clean Articles of Steel.—An excellent method of cleaning steel atricles which have become rusted or oxidized consists in rubbing the surfaces with pure sweet or olive oil, applying several coats, then laying them aside for several days, after which they are thoroughly rubbed with unslaked lime.—*Popular Mechanics.*

Rapid Repair of Plates or Bridges by Means of Synthetic Cement.—In case of a necessary rapid repair of a plate or a bridge with non-interchangeable teeth, where appearance is more important than durability, retentions are cut in the plate or the body of the bridge with a fine bur, leaving the pins undisturbed. In place of the broken tooth, a temporary substitute is built up and modeled in synthetic cement.—*Journal Odontologique.*

A Practical Spatula for Inserting Approximal Silicate Cement Fillings.—If, in filling approximal cavities with silicate cement, no tantalum spatula is at hand, and bone or agate spatulas prove too thick to obtain good condensation and contour, a stick of hickory wood is whittled into the shape of a spatula of the desired thickness. This wood is dense and supple enough to afford entire satisfaction.—C. Mussat, *Journal Odontologique.*

Diagnosing the Seat of Toothache by Heat.—Patients very often complain of toothache upon the eating of hot food. The sensitive tooth, however, cannot always be found by applying hot water from the syringe, since the water invariably comes in contact with several teeth. The offending tooth can readily be determined by grasping a piece of impression compound of the size of a marble with pincers, heating it over an alcohol lamp, and touching with it the teeth suspected.—Von Beust, *Archiv fuer Zahnheilkunde.*

To Tighten a Vulcanizer.—The india-rubber packing is coated with French chalk, the lid put in position, the center-screw lightly, not tightly, turned down upon it, and when the steam is up, the center-screw is given a further very slight, tightening turn with the spanner.

By working in this way no part of the vulcanizer is ever strained, the india-rubber packing is not injured and lasts for years. —*Ash's Monthly.*

Protecting the Pulp under Silicate Cement Fillings.—Although death of the pulp under silicate cement no longer occurs so frequently, it is advisable, in shallow cavities, to introduce a sheet of gold foil into the cavity, adapt it closely by pressing upon it with a piece of spunk or a pellet of cotton, and removing all excess so as to leave the margins free. In deeper cavities, an insulating layer of Gilbert's stopping or Harvard cement or both should be inserted. —C. Fahsel, *Archiv fuer Zahnheilkunde.*

A Reasonable and Useful Workbench.—A four-foot roll-top desk has all the accommodations required in a workbench, and can be purchased very reasonably second-hand. The vulcanizer is placed on top. Holes are bored in the lower part of the back for gas connections. One of the lower drawers can be removed to make room for foot bellows. A heavy sheet of asbestos is laid on the table part and either nailed or screwed on, for soldering. A removable bench block can be added, for filing.—F. Byrne, *British Dental Journal.*

Oral Bacteria and Dental Caries.—H. P. Pickerill and S. T. Champtaloup have studied the organisms present in the mouths of a number of Maori children who were apparently decidedly resistant to dental caries. They found that the organisms were quite as abundant, both in variety and in numbers, as in the mouths of Europeans who are subject to dental caries. The numbers and types of organisms, therefore, are not at the bottom of the immunity of the Maoris to dental caries.—*British Med. Journal*, per *N. Y. Med. Journal.*

Separating the Flask in Plate Work.—To avoid the unpleasant use of oil or vaselin for separating the halves of the flask when investing a denture prior to vulcanization, French chalk should be rubbed on with a fairly large short-haired, camel's-hair brush. The casting is sharp, and the flask is much cleaner to handle than when the separating is done by the more usual method.—B. W. NEAVE, *Commonwealth Dental Review.*

Filing Small Wire Rods in a Lathe.—Reducing the diameter of a small wire rod by filing, while it is turning in a lathe, is a difficult thing to do, as the pressure of the file on one side bends the rod. The filing may be easily accomplished by using two files. In this manner almost any amount of pressure can be applied by squeezing the files together, without danger of bending the rod.—*Popular Mechanics.*

Rubber Preservative.—Articles of rubber, including rubber tubing, can be preserved from becoming hard by coating them with a mixture of gelatin 70 parts, glycerin 20 parts, barium sulfate 10 parts. The mixture is applied hot, and upon cooling forms a film which does not harden or crack. By preserving the surface from direct contact with the air, this coating keeps the elasticity of the rubber from deterioration.—*Edwards' Dental Quarterly.*

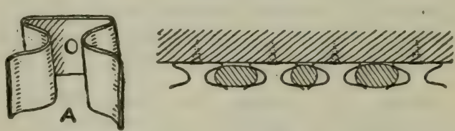
Preventing the Displacement of Artificial Teeth in Packing the Rubber.—In order to prevent the breaking of the investment plaster that partially covers and holds the teeth in the vulcanizing flask, and any subsequent displacement of the teeth, especially molars, in packing the rubber, a kitchen match, from which the head has been cut or burned off, is placed into the layer of plaster that holds these teeth. Quite some force can then be applied in packing the rubber.—QUINCEROT, *Le Monde Dentaire.*

Making Undercuts in Gold Inlays.—After making the inlay model in wax and removing it from the cavity, a sprue is attached to it in the usual manner, and with a sharp bur in the engine a groove is cut, or any portion of the inlay removed, being careful not to approach the edges. The wax cut by the bur can be blown away with the chip-blower or compressed-air syringe. The surface of the wax pattern should then be oiled before investing, to insure a smooth casting. All surplus oil should be wiped away before investing.—*N. J. Dental Journal.*

A Burner for Soldering Small Work.—An ordinary acetylene burner connected with coal or city gas gives an intensely hot, non-luminous flame, owing to the forced draft of air passing through the small holes. This flame will melt silver and copper, and also silver solder. Its great advantage lies in the fact that it may be used for sweating together small articles rapidly and with great neatness. This blowpipe can always be kept burning, as the amount of gas it consumes is very small.

A single jet of flame is obtained by stopping up one of the tips, which is very useful in many ways. This flame may contain a small luminous spot on some city gas, but this does not interfere with the heat.—*Popular Mechanics.*

Tool-Holders for the Mechanical Laboratory Made of Brass Clips.—Hangers to grip tool handles can be easily formed of sheet metal in any desired material. The clips are



shaped as shown at A in the sketch. Any number of the clips may be fastened with screws to a wood crosspiece or a wall in such a manner as to make openings into which the handles of the tools are pressed. Before fastening the clips they should be spaced for the widths of the handles.—*Popular Mechanics.*

The Conservation of Roots.—The conservation of tooth-roots is as important as the filling of more or less defective crowns, first, for esthetic and physiologic reasons, because the absorption of the alveolar process subsequent to the extraction of roots impairs facial expression, and contributes to loosening and tipping of the remaining teeth. Especially in young persons, not only the roots of anterior teeth must be preserved whenever possible, but also those of the posterior teeth in order to preserve the fulness of the cheeks.

Even if the roots are not to be used for pivot teeth, crowns, or bridge abutments, correctly treated and preserved roots afford a much better basis for prosthetic pieces than when absorption of the alveolar ridge has taken place.—A. JOACHIM, *Journal Dent. Belge*, per *Deutsche Zahnaerztliche Wochenschrift.*

Vulcanite Dentures.—In making vulcanite dentures it frequently happens, even after every care has been taken in waxing-up and articulating the teeth, that upon vulcanizing, the bite and articulation are more or less altered. Many reasons have been adduced as to the cause of this alteration, such as expansion of the plaster or rubber, over-packing, badly fitting flasks, poor plaster, etc., but we are inclined to think that it is primarily due to the shrinkage of the wax, especially in lower dentures, during the flasking process. This shrinkage is chiefly brought about by the chilling of the wax when the waxed-up case is taken from the model and embedded in cold plaster of Paris. Although the shrinkage may be only slight, it is sufficient to alter the position of the teeth and to necessitate a considerable amount of grinding. To overcome this shrinkage in the wax, warm water should be used for mixing with the plaster of Paris. This will prevent shrinkage, and, provided the case is not over-packed, there will be no appreciable difference between the waxed-up form and the vulcanite denture; a good fit will be obtained.—*Ash's Monthly.*

Oleate of Cocain for Desensitizing Hypersensitive Dentin.—The importance of preserving the first permanent molar is recognized by all. Frequently cases present in the mouths of young children where the first permanent molar is badly decayed, with the pulp fortunately still vital. How to treat and protect this pulp is often a very difficult problem. If the cavity is such that a remedy can be sealed in, I frequently use the official oleate of cocain. This is a rather new preparation, having been introduced for the first time in the last edition of the United States Pharmacopeia. The cavity should be kept dry, preferably by the use of the rubber dam, when all dentin which is to be obtunded should be covered with the remedy. Dry cotton is then placed over it and the cavity sealed with a temporary cement to prevent pressure. In case the oleate of cocain cannot be obtained, I suggest the following formula which will act equally as well: 2 grains each of the alkaloidal cocain and thymol, added to ½ dram sterilized liquid petroleum. This formula has the added advantage of being a disinfectant as well as an analgesic.—E. W. Elliot, *Dental Review.*

Value and Requirements of Antiseptic Mouth-washes.—A great many people—and among them some who are medical men—believe that by a diligent daily use of antiseptic mouth-washes, the bacteria in the mouth can be as good as entirely gotten rid of. We may safely assume that in general the effectiveness of mouth-washes is much overrated. In point of fact, it is scarcely possible, even with the strongest remedies, to render the mouth entirely free from germs. A continuous use of the stronger disinfectants is by no means uninjurious to the mucous membrane of the mouth, for these substances exercise almost always a more or less caustic effect upon the mucous membrane. But a healthy mucous membrane is necessary for the preservation of healthy teeth, as it offers a much more unfavorable soil for bacteria than a disordered, chronically inflamed mucous membrane.

Just as a single particularly thorough disinfection of the mucous membrane of the mouth with the stronger antiseptics, under the care of a medical man, may be very advantageous, so an injudicious constant use of mouth-washes which injure the mucous membrane may be extremely dangerous. A hygienic mouth-wash used as a cosmetic must, before everything else, be absolutely innocuous.

An excessive development of the bacteria in the mouth is hindered in the simplest way by healthy mastication. When food is taken a great number of bacteria are carried down with it into the stomach. There they are destroyed by the gastric juices. It is for this reason that the number of bacteria in the mouth is greatest in the morning, after the protracted repose of the night. Continued animated talking also tends to diminish the number of the bacteria.

According to the author, there are, among all the preparations recommended for the care of the mouth, a very few only which can be employed for daily use without any deleterious effect, and have at the same time a distinct power of destroying bacteria. He instances the solution of cooking-salt—7:100. A 2 per cent. solution of sodium bicarbonate is almost innocuous.

It must be added that a mechanical cleansing of the oral cavity with the assistance of a suitable tooth-brush, accompanied by rinsing out the mouth, must always form an essential part of all care of the mouth and teeth.

We must require of a satisfactory antiseptic wash for rinsing the mouth that it shall be (1) perfectly uninjurious to the mucous membrane (no caustic effect), to the teeth (no destruction of calcium salts), and to the whole organism (no poisonous qualities); (2) sufficiently antiseptic in its effects, and (3) of a pleasant smell and taste.—C. Roese, *Zeitschrift f. Hygiene* per *Brit. Journ. of Dental Science.*

Society Notes and Announcements.

GOLDEN ANNIVERSARY OF THE ILLINOIS STATE DENTAL SOCIETY,

March 23 to 26, 1914.

The Illinois State Dental Society will celebrate its Fiftieth Anniversary in Chicago, at the Hotel La Salle, March 23 to 26, 1914. It is confidently expected that this will be the largest, and those having the meeting in charge hope to make it the best, dental meeting ever held. To this end the officers of the society herewith extend a cordial invitation to every ethical dentist. We want you to attend and participate in this GREAT DENTAL MEETING.

Three sessions only will be devoted to the literary part of the program. There will be a symposium by two of our older men on the "Illinois State Dental Society, Its History, Achievements, and Present Standing." Then there will be two papers on dentistry proper, one an "Oration on Operative Dentistry," and the other, "Modern Crown and Bridge Work." In the completed program you will learn the names of the essayists, and you will say that no better or more capable men for the task could possibly have been selected.

As to CLINICS, this great meeting might well be called a "Clinical Congress."

International Day—*Monday, March 23d.*

Clinicians from about everywhere will demonstrate the best their respective states or countries have to offer for the advancement of dentistry. The committee having this day in charge desire to co-operate with the presidents and secretaries of societies, so that the men selected to clinic may be truly representative.

Illinois Day—*Tuesday, March 24th.*

Clinics will be given by members of the Illinois State Dental Society. Two hundred men will demonstrate. Each section (of the fourteen) will be manned by from fifteen to eighteen clinicians, and all will be running simultaneously, but in such a manner that no member of the profession in attendance will miss a single point of interest.

Chicago Day—*Wednesday, March 25th.*

To complete the plan of this great dental meeting, the third day will be devoted to the celebration of the FIFTIETH ANNIVERSARY of the Chicago Dental Society. A large number of clinics will be given in the offices of Chicago practitioners.

Banquet.

The climax will come in the evening, when an informal banquet will be held at the Hotel La Salle, to which all members, guests and ladies are cordially invited. Price per plate, $2.00.

There will be an exhibition of dental supplies and appliances given by manufacturers of these commodities. The entire eighteenth floor of the Hotel La Salle will be given over to these exhibitors.

Chairman of the Chicago Program Committee—Dr. Geo. N. West, 32 N. State st., Chicago. Chairman Exhibit Committee—Dr. P. B. D. Idler, 209 S. State st., Chicago.

Henry L. Whipple, *Sec'y,*
Quincy, Ill.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The regular meeeting of the Academy of Stomatology will be held Tuesday, February 24, 1914, at the College of Physicians, Twenty-second st. above Chestnut, Philadelphia, Pa., at 8 P.M. sharp.

Nathan Gildersleeve, M.D., of Philadelphia, will present a paper entitled "Pathology of Dental Infections." M. J. Barrett, D.D.S., of Philadelphia, will also present a paper entitled "Anatomy and Histology of the Teeth and Adjacent Parts." Both papers will be illustrated by lantern slides.

F. R. Stathers, *Sec'y,*
Philadelphia, Pa.

Sixth International Dental Congress.

London, August 3 to 8, 1914.

PATRON: HIS MAJESTY THE KING.

MUCH progress has been made with the arrangements for the Sixth International Dental Congress, which will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and also to the self-governing Dominions of the British Empire to send official representatives to the congress, and several delegates have already been appointed. Invitations have been issued to dental societies and organizations throughout the world, and steps have been taken to secure as Reporters or Introducers of discussions in the ten sections of the congress the co-operation of leading specialists and representative authorities in all branches of dental surgery.

National committees are already at work in America, France, Germany, etc. It is hoped that national committees in all countries will stimulate interest in the congress and enlist the active support of all eligible members of the profession.

The Committee of Organization has completed the following list of Sections, Officers, and Subjects for Report and Debate. Hon. presidents of sections, representing the various countries included in the International Dental Federation (F.D.I.) will be appointed. Those nominated by the U. S. A., France, and Germany appear below. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

A Demonstrations Committee is being organized, with Mr. T. A. Coysh as chairman and Mr. W. F. Mellersh as hon. secretary.

The International Dental Congress Museum is intended to be representative of every section of the congress. Mr. A. Hopewell-Smith is chairman of the committee, and Mr. F. N. Doubleday is the hon. general secretary. Application forms and all information will be sent to all intending exhibitors on application at the Office of the Congress, 19 Hanover Square, W.

The Hon. Secretaries of Section IX would be glad to hear from gentlemen in all countries willing to give *short* demonstrations of lantern slides, showing (*a*) Means of affording public instruction in Dental Hygiene, *e.g.* lecture material, charts; (*b*) Photographs of School Dental Clinics or other Institutions for Public Dental Treatment. It is hoped to make this a valuable and interesting feature of the section.

The Rules of the International Dental Congress provide that all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of the country in which they practice, are eligible for membership.

The subscription for members of the congress will be 30s. (38 francs; 31 marks; 7½ dollars), and for members of their families accompanying them, 15s. (19 francs; 15½ marks; 3¾ dollars).

Messrs. T. Cook & Son, Ludgate Circus, E.C., have been appointed as official Hotel and Travel Agents for the congress, and all applications should be made to them direct.

The Offices of the Congress are situate at 19 Hanover Square, London, W., to which address all communications should be sent.

ORGANIZATION.

Officers.

President: J. Howard Mummery, M.R.C.S., L.D.S.Eng.

Vice-Presidents: W. B. Paterson, L. Matheson, W. Guy, Dr. A. W. W. Baker, and the President of the British Dental Association.

President of Committee of Organization: W. B. Paterson, F.R.C.S., L.D.S.Eng.

Hon. Treasurer: H. Baldwin, M.R.C.S., L.D.S.Eng.

Hon. General Secretaries: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.D.S.Eng.; H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.

Committee of Organization.

H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.; Wm. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.; Walter Harrison, L.D.S., D.M.D.Harvard; J. Howard Mummery, M.R.C.S., L.D.S.; W. B. Paterson (president of the committee), F.R.C.S., L.D.S.

Appointed by the British Dental Association.

J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.; H. Baldwin, M.R.C.S., L.D.S.; Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.; Walter H. Coffin; W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.; A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.; Montagu F. Hopson, L.D.S.; L. Matheson, L.D.S.; Frank J. Pearce, L.D.S., D.D.S.Penn. (hon. secretary of the committee); G. O. Whittaker, L.D.S.

THE SECTIONS.

Section I.—Dental Anatomy, Histology, and Physiology.

OFFICERS.

President: A. S. Underwood, M.R.C.S., L.D.S.Eng.

Hon. Presidents: Monsieur J. Choquet, Paris; Dr. M. H. Cryer, Philadelphia, U.S.A.; Hofrat Professor Dr. O. Walkhoff, Munich.

Vice-Presidents: D. E. Caush, L.D.S.I.; J. Humphreys, L.D.S.I., M.D.S.Birm.; and J. A. Woods, L.D.S.Eng., M.D.S.Liv.

Hon. Secretaries: E. C. Sprawson, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. W. Wellings, L.D.S.Edin., B.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

The Evolution of the Human Dentition.

Calcification.

Chemistry and Physiology of Saliva.

Section II.—Dental Pathology and Bacteriology.

OFFICERS.

President: A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Cavalié, Bordeaux; Dr. T. B. Hartzell, Minneapolis, U.S.A.; and Professor Dr. Römer, Strassburg.

Vice-Presidents: F. J. Bennett, M.R.C.S., L.D.S.Eng.; J. Lewin Payne, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. W. Watson, L.D.S.Edin.

Hon. Secretaries: S. P. Mummery, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. G. G. Plumley, M.B.Lond., L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Etiology of Dental Caries.

The Etiology and Pathology of "Pyorrhea Alveolaris."

The Pathology of the Antrum.

Pathological Conditions of the Dental Pulp.

Discussion on the British Dental Association Odontome Catalog.

Section III.—Dental Surgery and Therapeutics.

OFFICERS.

President: W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Dieck, Berlin; Dr. E. S. Gaylord, New Haven, U.S.A.; Dr. Pont, Lyons.

Vice-Presidents: W. Hern, M.R.C.S., L.D.S.Eng.; J. B. Parfitt, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. O. Whittaker, L.D.S.Eng.

Hon. Secretaries: F. N. Doubleday, L.R.C.P., M.R.C.S., L.D.S.Eng.; and W. Parker Harrison, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) The Inflammatory Diseases of the Gingival Margin and Periodontal Membrane (pyorrhea alveolaris).

(*a*) The clinical signs.

(*b*) Local treatment.

(*c*) Treatment by ionic medication.

(*d*) Treatment by vaccines.

Note.—It is particularly requested that all papers should be accompanied by photographs, radiograms, etc., demonstrating the progress of cases cited and the results of treatment.

(2) The Restoration of Lost Portions of Tooth Substance by Inlaying.

(*a*) Inlay materials and their manipulation.

(*b*) Principles of cavity preparation.

(*c*) The cement lute.

(*d*) Comparison of inlays with fillings.

(3) Oral Sepsis.

(*a*) Oral sepsis in relation to general disease.

(*b*) The prevention of oral sepsis.

(*c*) The treatment of oral sepsis.

(*d*) The question of crowns, bridges and dentures in relation to oral sepsis.

Section IV.—Dental Physics, Chemistry, Radiography, and Metallurgy.

OFFICERS.

President: Montagu F. Hopson, L.D.S.Eng.

Hon. Presidents: Dr. J. P. Buckley, Chicago, U.S.A.; Monsieur Franchette, Paris.

Vice-Presidents: C. A. Clark, L.D.S.I.; H. T. Dreschfeld, L.D.S.Edin.; and R. Lindsay, L.D.S.Edin.

Hon. Secretaries: W. B. Hepburn, L.D.S.Glas., and A. E. Ironside, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Uses and Advantages of X rays as an Aid to Diagnosis, including the differentiation of the radiographic appearances of normal and abnormal tissue.

The Structural and Other Changes Arising in Connection with Metals Used in the Mouth.

The Theory and Practice of Pressure Casting. This report will be taken at a conjoint meeting with Section V. The Reporters chosen for Section IV will deal with the *theory.*

Section V.—Dental Prosthesis.

OFFICERS.

President: W. Simms, L.D.S.I.

Hon. Presidents: Dr. D. O. M. Le Cron, St. Louis, U.S.A.; M. Paul Martinier, Paris; Professor Dr. Riegner, Breslau.

Vice-Presidents: G. Brunton; D. P. Gabell, L.R.C.P., M.R.C.S., L.D.S.Eng.; G. J. Goldie, L.R.C.P.&S., L.D.S.Edin.

Hon. Secretaries: H. J. Morris, L.D.S.Eng., and Wilton Thew, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

Articulation and Articulators.

Design and Retention of Partial Dentures.

The Theory and Practice of Pressure Casting. Conjointly with Section IV. Reporters for Section V will deal with the *practice.*

Section VI.—Orthodontics.

OFFICERS.

President: J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Dr. R. A. Day, San Francisco, U.S.A.; Dr. Leon Frey, Paris; Zahnarzt Schröder-Benseler, Cassel.

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Hon. Secretaries: H. Chapman, L.D.S.Eng., D.D.S.Penn.; E. L. Councell, L.R.C.P., M.R.C.S., L.D.S.Eng.; B.D.S.Liv.

SUBJECTS FOR REPORT AND DEBATE.

The Unification of Terminology and Classification.

The Problem of Retention, with a view to Permanence of Result and Minimum of Danger.

Nasal Obstruction in relation to Orthodontics; in two parts, viz: (*a*) The Effects of the Secretions of the Ductless Glands. (*b*) The Effect of the Expansion of the Dental Arches, with or without the Opening of the Sutures.

Root Movement.

The Relative Advantages of Fixed and Movable Appliances.

Section VII.—Oral Surgery and Surgical Prosthesis.

OFFICERS.

President: J. G. Turner, F.R.C.S., L.R.C.P., L.D.S.Eng.

Hon. Presidents: M. Leon Delair, Paris; Dr. J. D. Patterson, Kansas City, U.S.A.; Sch. Rat. Professor Dr. Partsch, Breslau; Professor Dr. Schröder, Berlin.

Vice-Presidents: T. S. Carter, L.D.S.Eng.; W. W. James, F.R.C.S., L.R.C.P., L.D.S.Eng.; G. M. P. Murray, F.R.C.S.I.

Hon. Secretaries: H. P. Aubrey, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. Barritt, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) Surgical Prosthesis of the Jaws.

(2) Late Results of Cleft Palate Operations.

(3) Treatment of Dental and Dentigerous Cysts.

One morning will be devoted to each subject, the rest of the time will be devoted to papers on subjects of surgical interest in the mouth.

Section VIII.—Anesthesia (General and Local).

OFFICERS.

President: W. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.

Hon. Presidents: Dr. T. P. Hinman, Atlanta, U.S.A.; Dr. J. Vichot, Paris; Professor Dr. Williger, Berlin.

Vice-Presidents: J. H. Gibbs, F.R.C.S., L.D.S.Edin.; W. A. Hunt, L.R.C.P., M.R.C.S.; J. W. Pare, M.D., C.M.Edin., L.D.S.Eng.

Hon. Secretaries: F. Coleman, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. H. Parrott, L.D.S.Eng., L.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

Gas and Oxygen, alone, in mixture, and in sequence, for the Extraction Operation.

Gas and Oxygen Analgesia for Conservative Operations.

Local Anesthesia with special reference to (*a*) Methods, (*b*) Drugs, (*c*) Sphere of Usefulness, (*d*) Contra-indications and Dangers.

Section IX.—Oral Hygiene, Public Instruction, and Public Dental Services.

OFFICERS.

President: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Jessen, Strassburg; Dr. Siffre, Paris; Dr. Herbert L. Wheeler, New York City.

Vice-Presidents: A. E. Baker, L.R.C.P., M.R.C.S., L.D.S.Eng.; Walter Harrison, L.D.S.Eng., D.M.D.Harv.; J. Sim Wallace, D.Sc., M.D., C.M.Glas., L.D.S.Eng.

Hon. Secretaries: C. F. Peyton Baly, L.R.C.P., M.R.C.S., L.D.S.Eng.; W. R. Wood, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Effects of Dental Treatment on National Health and Physique.

Prophylaxis at Different Ages.

Lantern demonstration of slides showing (*a*) Means of affording Public Instruction in Dental Hygiene, *e.g.* lecture material, charts, etc.; (*b*) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or other Institutions in which public dental treatment is being carried out. To be contributed to by all countries willing to send representatives. It is intended that many dentists should exhibit slides showing the working of institutions, or of public instruction, and very briefly describe them.

Section X.—Dental Education.

OFFICERS.

President: W. H. Gilmour, L.D.S.Eng., M.D.S.Liv.

Hon. Presidents: Dr. Conrad Cohn, Berlin; Dr. Henry W. Morgan, Nashville, U.S.A.; Dr. Maurice Roy, Paris.

Vice-Presidents: T. Gaddes, M.D.Denver, L.D.S.Eng. and Edin.; F. W. Richards, L.D.S.Eng.; R. Wynne Rouw, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Secretaries: F. B. Bull, L.D.S.Eng.; G. Sheppard, L.D.S.Eng., F.R.C.S., L.M.I., L.R.C.P.I.

SUBJECTS FOR REPORT AND DEBATE.

The Teaching of Bacteriology for Dental Students, with special reference to (*a*) the Method of Teaching; (*b*) the Extent of the Teaching.

A Practical Synopsis of Medical and Surgical Teaching for Dental Students.

First Principles in Practical Teaching.

Methods of Teaching Orthodontics to Dental Students.

Sixth International Dental Congress.

THE CONGRESS MUSEUM.

Its Nature and Scope.

The Museum will be an international collection of objects of interest, and be representative of every section of the congress. Its nature and scope include—

1. Specimens showing the Evolution of Tooth Forms and of the Dentition of Man. Histological Preparations bearing upon recent research. Exhibits illustrating the Chemical Composition and Physiological Action of the Saliva.

2. Specimens of Morbid Conditions of the Teeth, Palate, Gums, and Jaws, such as Odontomes, Dental and Dentigerous Cysts, New Growths, Diseases of the Periodontal Membrane, etc. Photomicrographs of Oral Micro-organisms, and Cultures of Micro-organisms in Test Tubes or in Petri Dishes. New Bacteriological Apparatus and Appliances.

3. Specimens of Teeth, Gums, and Jaws affected by "Pyorrhea Alveolaris." Microscopical and Lantern Slides of the same. Exhibits of Various New Methods of Inlaying Cavities in Teeth. Exhibits of New Methods of Crowning Teeth.

4. Radiographs of the Normal Dental Tissues, and of Diseases of the same and Associated Parts.

5. Exhibition of various kinds of Articulators. Specimens showing the various Methods of "Pressure Casting." Specimens showing modern forms of Continuous-Gum Work.

6. Models showing Abnormalities in Position of the Teeth, and Appliances for the Correction of the same.

7. Specimens illustrating Methods of Dealing with Surgical Conditions of the Teeth and Jaws, including Cleft Palate, Hare-lip, Fracture and Resection of the Jaws.

8. Specimens illustrating the History and Evolution of Anesthesia.

9. Photographs, Charts, Diagrams, Specimens, and Statistics of School Clinics. Methods in the Instruction of the Public in the principles of Oral Hygiene.

10. Instruction Forms, Charts, Diagrams, Specimens, and Demonstration Models used in relation to Dental Education. The Specimens will include those employed for teaching purposes, and also Specimens of Work of both Students and Pupils, completed in accordance with the definite courses given.

11. Historical Objects of Interest, such as Books, Instruments, Pictures, etc.

Dr. A. Hopewell-Smith, chairman, earnestly invites co-operation in making this museum and congress a success, and will be happy to forward the "Regulations," with "application and entry form" for intending exhibitors. Write him at International Dental Congress Office, 19 Hanover Square, London, W.

Sixth International Dental Congress.

ARRANGEMENTS OF THE AMERICAN NATIONAL COMMITTEE

APPOINTED BY THE NATIONAL DENTAL ASSOCIATION.

THE committee having in charge the affairs of the congress relating to the United States have selected the following to take part in the congress program:

Addresses.

Dr. H. J. BURKHART, Batavia, N. Y. Address on behalf of the National Dental Association at the opening session.

Dr. EDWARD C. KIRK, Philadelphia, Pa. Address before the general session, on the afternoon session of the opening day. Subject, "The Tendencies in Dental Education."

Reporters.

SECTION I: *Dental Anatomy, Histology, and Physiology.*

"The Evolution of the Human Dentition." Dr. I. N. Broomell, Philadelphia, Pa.

"Calcification." Dr. A. R. Starr, New York, N. Y.

"Chemistry and Physiology of Saliva." Dr. Edward C. Kirk, Philadelphia, Pa.

SECTION II: *Dental Pathology and Bacteriology.*

"The Etiology of Dental Caries." Dr. B. Holly Smith, Baltimore, Md.

"The Etiology and Pathology of 'Pyorrhea Alveolaris'." Dr. Percy R. Howe, Boston, Mass.

"Pathological Conditions of the Dental Pulp." Dr. R. W. Bunting, Ann Arbor, Mich.

"The Pathology of the Antrum." Dr. Chas. H. Oakman, Detroit, Mich.

SECTION III: *Dental Surgery and Therapeutics.*

"Inflammatory Diseases of the Gingival Margin and Periodontal Membrane: Pyorrhea Alveolaris." Dr. T. Sidney Smith, Palo Alto, Cal.

"Restorations of Lost Portions of Tooth Substance by Inlaying." Dr. R. Ottolengui, New York, N. Y.

"Oral Sepsis in Relation to General Disease." Dr. C. N. Johnson, Chicago, Ill.

"The Prevention of Oral Sepsis by Treatment." Dr. J. D. Patterson, Kansas City, Mo.

SECTION IV: *Dental Physics, Radiography, and Metallurgy.*

"The Uses and Advantages of X Rays as an Aid to Diagnosis, including the Differentiation of the Radiographic Appearances of Normal and Abnormal Tissue." Dr. Howard R. Raper, Indianapolis, Ind.

"The Structural and Other Changes Arising in Connection with Metals Used in the Mouth." Dr. Clarence J. Grieves, Baltimore, Md.

"The Theory and Practice of Pressure Casting." Dr. Weston A. Price, Cleveland, Ohio.

SECTION V: *Dental Prosthesis.*

"Articulation and Articulators." Dr. J. H. Prothero, Chicago, Ill.

"Design and Retention of Partial Dentures." Dr. H. J. Goslee, Chicago, Ill.

SECTION VII: *Oral Surgery and Surgical Prosthesis.*

"The Late Results of Cleft-Palate Operations." Dr. Truman W. Brophy, Chicago, Ill.

"The Treatment of Dental and Dentigerous Cysts." Dr. Wm. Carr, New York, N. Y.

"Surgical Prosthesis of the Jaws." Dr. M. C. Smith, Lynn, Mass.

SECTION VIII: *Anesthesia, General and Local.*

"Gas and Oxygen, Alone, in Mixture, and in Sequence, for the Extraction Operation." Dr. Chas. K. Teter, Cleveland, Ohio.

"Gas and Oxygen Analgesia for Conservative Operations." Dr. Thos. B. Hartzell, Minneapolis, Minn.

"Local Anesthesia with Special Reference to (a) Methods, (b) Drugs, (c) Sphere of Usefulness, (d) Contra-indications and Dangers." Dr. Eugene R. Warner, Denver, Colo.

SECTION IX: *Oral Hygiene, Public Instruction, and Public Dental Service.*

"The Effects of Dental Treatment on National Health and Physique." Dr. Herbert L. Wheeler, New York City.

"Prophylaxis at Different Ages." Dr. A. R. Melendy, Knoxville, Tenn.

"Lantern Demonstration of Slides, showing (a) Means of Affording Public Instruction in Dental Hygiene, *e.g.* Lecture Material, Charts, etc.; (b) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or Other Institutions in which Public Dental Treatment is being Carried Out." Dr. Wm. A. White, Phelps, N. Y.

SECTION X: *Dental Education.*

"Methods of Teaching Orthodontics to Dental Students." Dr. S. H. Guilford, Philadelphia, Pa.

The following have been selected as

Honorary Presidents of Sections.

I. *Dental Anatomy, Histology, and Physiology.* Dr. Mathew H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. LeCron, London, England.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

A list of essayists and clinicians will be published later.

The committee invite the ethical members of the profession of the United States to become members of the congress. Membership, which includes admission to the congress sessions and a copy of the proceedings, is $7.50, and for members of their families accompanying them $3.75.

Dr. Herbert L. Wheeler, 560 Fifth ave., New York City, has been appointed by the committee to arrange for steamship rates, sailing dates, itinerary, etc. Those desiring to attend the congress, sailing with the American delegation—immediately following the meeting of the National Dental Association, Rochester, N. Y., which closes July 10, 1914—are requested to correspond with Dr. Wheeler.

[See also notice from Committee on Transportation, next page.]

TRUMAN W. BROPHY, *Chairman*,
WM. CARR,
S. H. GUILFORD,
WALDO E. BOARDMAN,
Committee.
BURTON LEE THORPE, *Sec'y*,
3605 Lindell Boulevard, St. Louis, Mo.

Sixth International Dental Congress.

COMMITTEE ON TRANSPORTATION.

The Committee on Transportation of the National Dental Association have completed arrangements with the International Mercantile Marine Co., comprising the American, Atlantic Transport, Leyland, Red Star, White Star, and White Star-Dominion lines, whose fleet includes such large, splendid and steady steamers as the "Olympic," "Oceanic," "Adriatic," "Baltic," "Cedric," "Celtic," "Lapland," "Minnewaska," "Minnehaha," "Minnetonka," "Minneapolis," "Laurentic" and "Megantic" sailing to and from numerous prominent ports in England and the Continent, and application for sailings and rates should be sent in at once.

Our delegates to the congress will be allowed a reduction of 25 per cent. from tariff rates on all steamers of the I. M. M. Co. lines sailing on and after July 9th from America, and to August 20th from Great Britain and Europe, with the single exception of the "Olympic," August 19th from Southampton and Cherbourg for New York.

Please note that when the concession referred to would bring the price for passage below the minimum rate of the steamer selected, the lowest rate of that steamer will be charged, as follows:

To or from Plymouth, Cherbourg and Southampton, "Olympic," $130.00; "Oceanic," $110.00.

To or from Queenstown and Liverpool, "Adriatic," $110.00; "Baltic," "Cedric," and "Celtic," $100.00.

To or from Dover and Antwerp, "Lapland," $97.50; other Red Star line steamers, $85.00.

To or from Plymouth, Cherbourg, and Southampton, "Majestic," $95.00.

To or from London, Atlantic Transport line, $85.00.

Between Montreal–Quebec–Liverpool, "Laurentic" and "Megantic," $92.50.

It is important in order to obtain good accommodation that delegates to the congress should communicate at once regarding reservations with the International Mercantile Marine Co., 9 Broadway, New York City, stating the dates of their proposed outward and return sailings, also their requirements as to accommodations. Applications will be filled in the order of their receipt. A deposit of 25 per cent. of the eastbound passage money is required when the reservation is made, the balance for the round trip being payable at least three weeks prior to the outward sailing.

The committee will also reserve dining-saloon seats, steamer chairs and rugs, the deck chairs and rugs renting at $1.00 each for the voyage. Seats can also be reserved on the trains to London, for which the rates, first class, are as follows: Via Southampton, $2.75; Plymouth, $7.50; Liverpool, $7.00; Dover, $4.75.

The committee also calls the attention of delegates to the "travelers' checks" issued by the International Mercantile Marine Co. in denominations of $10.00, $20.00, $50.00, $100.00 and $500.00, which will be found the safest and most convenient way of carrying funds, as the checks are accepted by hotels, shops, banks, etc., throughout Great Britain and Europe. These are issued for their face value, plus ½ of 1 per cent. commission, and checks not used will be redeemed at face value. It will be to the advantage of the association for its members to use these checks.

As the White Star sailings available for the congress, from New York, are on July 9th, 16th, 18th, arrangements have been made with the Holland-American line for those who wish to sail on Tuesday, 14th, to do so on their steamer New Amsterdam, on which the following rates have been secured: They will allow a discount of 25 per cent. on the tariff rate, for all rooms on deck A (except the *chambres de luxe*), with the understanding that each room be occupied by three passengers. On decks B and C they will place at our disposal all outside and inside rooms we require, at the minimum rate per berth, provided that each room be occupied by three passengers. The number of passengers to be carried to be divided in proportion to the available accommodations on decks A, B, and C.

Any communications concerning this boat should be sent to Mr. Nyland, Holland-American line, 21 State st., New York City.

HERBERT L. WHEELER, *Committee*,
560 Fifth ave., New York City.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE forty-sixth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 14, 15, and 16, 1914. The literary program will be rendered at the new State Educational building. The clinics will be given at the Hotel Ten Eyck and the dental exhibits in the hotel rooms, as was arranged for the 1913 meeting, which proved very satisfactory to the exhibitors.

An exceptionally attractive meeting is being arranged. A cordial invitation is extended to all ethical dentists in New York and sister states.

Exhibitors please address Dr. O. J. Gross, 404 Union st., Schenectady, N. Y., for space.

There will be the usual reduction of railroad rates on the certificate plan.

A preliminary notice will be issued during the month of March 1914, and the following month the completed program.

The Executive Council will meet at the Hotel Ten Eyck on Wednesday, May 13th, at 3 P.M.

For further information address

A. P. BURKHART, *Sec'y,*
52 Genesee st., Auburn, N. Y.

MASSACHUSETTS BOARD OF REGISTRATION.

A MEETING of the Massachusetts Board of Registration in Dentistry will be held in Boston, March 4, 5, and 6, 1914.

For applications and further information apply to

G. E. MITCHELL, *Sec'y,*
4 Water St., Haverhill, Mass.

KENTUCKY STATE DENTAL ASSOCIATION.

THE Kentucky State Dental Association will hold a four-day postgraduate course at the Seelbach Hotel, in Louisville, March 9, 10, 11, and 12, 1914.

The lecturers for the course are Dr. Geo. H. Wilson of Cleveland, Ohio, on "Prosthetic Dentistry"; Dr. Thos. P. Hinman of Atlanta, Ga., on "Operative Dentistry"; and Dr. A. J. Bush of Columbus, Ohio, on "Crown and Bridge Work."

We shall also have papers and clinics for those who do not care to take the postgraduate course. The usual invitation is extended to all ethical practitioners to attend. We are already assured of a successful meeting.

CHAS. R. SHACKLETTE, *Sec'y,*
Louisville, Ky.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending December 27, 1913:

First. Lieut. Frank H. Wolven granted leave of absence for three months.

Itineraries: Each of the following-named dental surgeons, with his enlisted assistant, will proceed at the proper time to the posts named, and report to the post and coast-defense commanders for temporary duty, for the purpose of rendering dental service during the periods indicated.

In no case will a dental surgeon remain at a post longer than the date set in the itinerary, except by the authority of the department commander.

Henry C. Peavey, ACT.D.S.: Ft. McKinley, Me., Jan. 1 to March 14, 1914. Ft. Williams, Me., March 16th to May 7th. Ft. Constitution, N. Y., May 8th to May 19th. Ft. Strong, Mass., May 20th to June 30th.

Claudius C. Baker, ACT.D.S.: Ft. Rodman, Mass., Jan. 1st to Jan. 13th. Ft. Adams, R. I., Jan. 14th to March 6th. Ft. Greble, R. I., March 7th to April 7th. Ft. Andrews, Mass. [incl. Ft. Revere, Ft. Warren, and Ft. Banks, Mass.], April 8th to June 30th.

Don G. Moore, ACT.D.S.: Ft. Totten, N. Y.; Jan. 1st to March 9th. Ft. Terry, N. Y., March 10th to May 4th. Ft. H. C. Wright, N. Y., May 5th to June 30th.

First Lieut. Frank L. K. Laflamme: Ft. Hamilton, N. Y., Jan. 1st to March 14th [incl. Ft. Wadsworth, N. Y.]. Ft. Hancock, N. J., March 16th to May 15th. Ft. Jay, N. Y., May 16th to June 30th. [The commanding officer, Ft. Wood, N. Y., will arrange with the commanding officer, Ft. Jay, N. Y., for the transfer of such men as are reported by the surgeon requiring dental treatment, accompanied by list of men.]

First Lieut. Edwin P. Tignor: Ft. Monroe, Va., Jan. 1st to April 24th. Ft. Du Pont, Del., April 27th to June 30th [incl. Ft. Mott, N. J.]

J. Craig King, ACT.D.S.: Ft. Myer, Va., Jan. 1st to March 12th. Washington Bar-

racks, D. C., March 13th to May 5th. Ft. Howard, Md., May 6th to June 10th. Ft. Washington, Md., June 11th to June 30th [incl. Fort Hunt, Va].

First Lieut. John R. Ames: Ft. McPherson, Ga., Jan. 1st to March 7th. Ft. Dade, Fla., March 11th to March 26th. Key West Barracks, Fla., March 30th to April 7th. Ft. Screven, Ga., April 10th to May 7th. Ft. Moultrie, S. C., May 8th to June 6th. Ft. Caswell, N. C., June 9th to June 30th.

Charles Tainter, ACT.D.S.: Ft. Barrancas, Fla., Jan. 1st to Feb. 3d. Ft. Morgan, Ala., Feb. 4th to Feb. 20th. Jackson Barracks, La., Feb. 21st to March 10th [incl. Ft. St. Philip, La.]. Ft. Crockett, Tex., March 11th to March 27th. Ft. Logan H. Roots, Ark., March 30th to April 20th. Ft. Oglethorpe, Ga., April 22d to June 30th.

Lowell B. Wright, ACT.D.S.: Madison Barracks, N. Y., Jan. 1st to Feb. 21st. Ft. Ontario, N. Y., Feb. 24th to March 19th. Ft. Niagara, N. Y., March 21st to April 14th. Ft. Porter, N. Y., April 15th to May 8th. Ft. Thomas, Ky., May 11th to June 30th.

Upon completion of this duty, the dental surgeons and their enlisted assistants will return to their stations.

For the week ending January 3, 1914—(No changes).

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER 1913.

December 2.

No. 1,080,261, to Isaac W. Bush. Automatic dental blower and syringe.

December 9.

No. 1,080,633, to S. B. Husch and G. S. Husch. Tooth-brush.

No. 1,080,634, to S. B. Husch and G. S. Husch. Tooth-brush.

No. 1,080,809, to Ray W. Burch. Dental articulator.

No. 1,080,878, to Curtis M. Ballenger. Dental appliance.

No. 44,997 (reissue), to Charles E. Carroll. Tooth-brush.

December 16.

No. 1,081,296, to Addison R. DePass. Jaw-brace.

No. 1,081,307, to James W. Ivory. Interchangeable artificial tooth.

No. 1,081,745, to W. A. Johnston, A. W. Browne, and F. W. Wallace. Nasal inhaler.

December 23.

No. 1,082,041, to Nathaniel E. Paine. Tooth-brush.

No. 1,082,052, to Robert H. W. Strang. Instrument for recording changes in tooth-regulating appliances.

No. 1,082,058, to Heinrich A. Wienand. Process for casting artificial teeth.

No. 1,082,365, to Thomas Steele. Method of manufacturing artificial tooth-fronts.

No. 1,082,366, to Thomas Steele. Interchangeable tooth.

No. 1,082,482, to C. K. Feter and D. A. Davies. Apparatus for heating nitrous-oxid-administering appliances.

December 30.

No. 1,082,589, to James F. Hardy. Dental broach-blank-making machine.

No. 1,082,630, to Lewis S. Hall. Dental forceps.

No. 1,082,681, to William E. Danner. Tooth-powder.

No. 1,082,776, to William J. Stewart. Porcelain tooth and backing for dental bridge work.

No. 1,082,919, to Lena Tubbs. Tooth-brush.

No. 1,083,039, to William D. Wagar. Dental engine.

No. 1,083,156, to Edwin Telle. Method of manufacturing dental plates.

No. 1,083,163, to L. T. Weaver and J. H. Weaver. Dental flask.

DR. JOHN NATHAN CROUSE.

THE

DENTAL COSMOS.

VOL. LVI. MARCH 1914. No. 3.

ORIGINAL COMMUNICATIONS.

METHODS OF FIXATION IN THE TREATMENT OF FRACTURES OF THE MANDIBLE.

By ROBERT H. IVY, M.D., D.D.S., Philadelphia, Pa.,

ASSISTANT INSTRUCTOR IN SURGERY, UNIVERSITY OF PENNSYLVANIA; ORAL SURGEON, PHILADELPHIA POLYCLINIC; ASSISTANT ORAL SURGEON, PHILADELPHIA GENERAL HOSPITAL.

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, Pa., June 24, 1913.)

THE multiplicity of appliances that have been devised for fixation of the fragments in fractures of the lower jaw is evidence that all cases are not suited to the same form of treatment, and also that no ideal and universally applicable method has yet been found.

VARIOUS METHODS, AND THEIR MERITS AND DEFECTS.

No originality is claimed for the methods advocated here, but the writer feels that their advantages have not been sufficiently brought to the notice of the dental profession in general. These methods have been in use for the past thirteen years in the dental school of the University of Pennsylvania, and at the Philadelphia General Hospital in the service of Prof. M. H. Cryer. In this hospital fractures of the lower jaw constitute about ten per cent. of all fractures admitted.

BANDAGES: BARTON'S AND GIBSON'S.

It will be well here to give a short account of the principal forms of treatment brought forward from time to time for fractures of the mandible, with comments on the merits and defects of each. The simplest method, of course, consists in the application of a Barton, Gibson, or four-tailed bandage, after bringing the upper and lower teeth into proper occlusion. It is the usual form of treatment in hospitals having no facilities for making splints. The method should be reserved for cases of fracture of the anterior portion of the jaw with little or no displacement, and in which the occlusion of the teeth is good. But even in cases of this kind, if the aid of a

dentist can be procured, some form of splint is advisable, as perfect approximation and fixation can only be maintained by this means. For cases that must be treated by a bandage. the Barton bandage is the best; it should be two inches wide and made of muslin, not gauze, as the latter stretches too readily, and may be reinforced by a pasteboard cup molded to fit the chin and well padded with cotton. (Fig. 1.)

FIG. 1.

Barton bandage.

MODIFICATIONS OF THE BARTON BANDAGE.

In some cases, where the fracture is in the posterior portion of the jaw, the bandage carried in front of the chin has a tendency to pull back the anterior fragment. This tendency can be prevented, in part at least, by modifying the bandage in the manner shown in Fig. 2, bringing it under the chin from the occiput instead of around the front. The Barton bandage can be further reinforced and given the character of a permanent dressing by following the turns of the muslin bandage with a bandage incorporated with plaster of Paris. (Fig. 3.) When the plaster sets, the bandage can be cut on each side, in front of, behind, and below the ear, so that the dressing can be removed in pieces to permit of further tightening by padding and trimming the cut edges. The pieces can again be fastened in place with adhesive strips or by means of a bandage.

FIG. 2.

Modification of Barton bandage, to overcome in part the tendency to pull the chin backward.

FIG. 3.

Plaster of Paris dressing over Barton bandage.

WIRE LIGATURES.

Wire ligatures passed around the teeth is the next form of treatment, in point of simplicity, employed to a considerable extent by the general surgeon. Gilmer of Chicago first advocated in 1887 fixation of the fragments by attaching the lower to the upper teeth by means of wires. Methods of intermaxillary lacing are described by Pickerill and others. They have the advantage of ease of application, and are no doubt efficient in the hands of their advocates, but their use seems to be limited to cases in which the teeth and occlusion approach perfec-

tion, and in which there is no difficulty in reducing the fragments.

Angle's bands can be readily applied, and adequate fixation secured where there is little tendency to displacement.

FIG. 4.

Radiograph of double fracture of mandible in front of the first molar on each side, showing Lane's steel plates in position. (Note the failure to adjust the fragments, as shown by position of first molar.)

WIRES AND PLATES.

Holding the fragments by means of wires passed through holes drilled in the bone is advocated by some surgeons. Others sometimes employ silver plates or the steel plates devised by Mr. Arbuthnot Lane for fractures of other bones. In my experience such methods have no place in the treatment of fractures of the jaw, and I can remember seeing at least three cases in which these means failed in the hands of competent surgeons; the wires or plates had to be removed without union having taken place, and the cases were complicated by extensive infection. Success in these cases followed treatment by intermaxillary splints, though the cure was considerably delayed owing to the first

method of treatment. The mandible, as contrasted with other bones, cannot be sufficiently immobilized with external dressings to make wiring or plating successful except in rare instances; moreover, in the lower jaw we are nearly always dealing with a compound fracture, predisposing to infection—which enlarges the drill holes in the bone; the wires or plates become foreign bodies, and consequently loosen. Besides, these open operations make unsightly scars on the face. (Fig. 4.) To my mind wires and plates are only indicated in cases with few or no teeth for the attachment of splints, where the element of infection is therefore not so prone to enter, and where accurate approximation of the fragments is not essential.

It has remained for the dental profession to devise the most efficient methods of treatment of fractures of the jaws, by utilizing the teeth for fixation of the fragments in absolutely accurate position. I will give a brief description only of some of the commoner forms of interdental splints.

Fig. 5.

Radiograph of fracture at angle, behind the teeth. (Cryer.)

THE HAMMOND SPLINT.

The Hammond splint consists of a heavy piece of wire bent to fit the buccal

and lingual surfaces of the teeth, and fastened in place by finer wire passed between the teeth. This splint is inadequate for fractures with much tendency to displacement, and its application is therefore limited.

THE GUNNING SPLINT.

The Gunning splint, probably the most commonly employed in this country at the present time, is made of vulcanite, and is attached to the teeth of both upper and lower jaws. The jaws are held apart, thus allowing a space to be made in the splint for the passage of liquid food. This splint can be used with good results in cases where there are teeth on both sides of the fracture, but is unsuited to cases in which the fracture is in the ramus, or where there are no teeth in the posterior fragment. The upper and lower teeth being held apart by this type of splint, there is a tendency for the center of motion in separating the jaws to be at the seat of fracture, if the latter is posterior to the teeth, causing a V-shaped space at this point. An open bite may therefore be the result, with inability to bring the incisors together, after union has taken place. (Fig. 5.) The vulcanite splint also is cumbersome and less hygienic than others to be described.

THE KINGSLEY SPLINT.

The Kingsley splint is a combination of an interdental splint and external bandaging. It consists of hard rubber, covering the lower teeth only, and having vulcanized into it iron wires which pass out of the mouth for the attachment of a bandage beneath the chin. This splint is obviously suited only to fractures between the teeth. It is, moreover, unsightly and cumbersome. It has the advantage that the mouth can be opened and closed during the period of treatment.

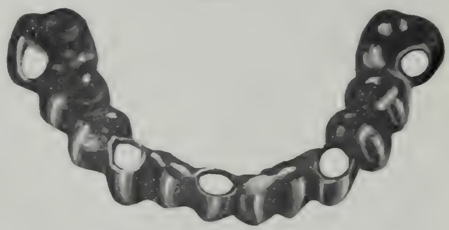
Dr. George M. Dorrance of Philadelphia, some years ago devised an external splint for fixation of fractures of the mandible.

We now come to the methods of treatment taught in the dental school of the University of Pennsylvania, and employed by Dr. Cryer and his assistants at the Philadelphia General Hospital. Either of two splints is used, according to the position of the fracture and the condition of the teeth.

THE SINGLE MANDIBULAR METAL SPLINT, FOR SIMPLE FRACTURES: ITS INDICATIONS AND CONSTRUCTION.

For fractures occurring in the body of the jaw, with at least two or three teeth on each side of the point of injury, and in which the tendency to displacement is not great, a metal interdental splint is found to fulfil all the requirements. (Fig. 6.) Credit for this appliance is given by various writers to Kingsley and Weston, Hullihan, Moriarty, and others, so that the idea must have occurred to several men independently. The impression for the splint should be taken in plaster of Paris, and as soon after the injury as the patient will permit. If the parts are greatly displaced, they may be adjusted as much as possible before taking the impression. An impression of the upper teeth should be taken at the same time. After the casts have been made, the lower cast should be cut through with a saw at the seat of fracture, and the pieces reassembled so that the lower teeth occlude properly with the upper. A zinc die and lead counter-die are now made of the lower teeth, and from them a cap is swaged covering all the lower teeth, or at any rate several teeth on each side of the fracture. This cap may be made of

FIG. 6.



Metal mandibular splint.

30-gage German silver or of gold. It may be strengthened by using two thicknesses if necessary, or by soldering a piece of half-wire around the labial surfaces of the teeth. The German silver fulfils every purpose, though it is not as attractive in appearance as gold; it may be plated if desired. The splint should embrace the teeth from the cutting-

Fig. 7.

Fracture of mandible between canine and first bicuspid. (Cryer.)

Fig. 8.

Mandibular splint in position. (Cryer.)

edges almost to the cervical margins, and should be perforated to permit the escape of overflow of cement. It is hardly necessary to dwell on the importance of getting the mouth into as clean a condition as possible before inserting the splint. The splint can then be fixed in place with Harvard or crown-and-bridge cement. If desired, a Barton bandage can be used to hold the splint in contact with the upper teeth until the following day, by which time the cement will have thoroughly hardened; the bandage can then be dispensed with. The patient will be able to open and close his mouth and masticate his food if he is ordinarily careful. This is an obvious advantage over a splint that holds the upper and lower jaws fixed. The splint should remain in place from three to four weeks, when firm union will generally have occurred. (Figs. 7 and 8.)

THE DOUBLE MANDIBULO-MAXILLARY METAL SPLINT, FOR COMPLICATED FRACTURES: ITS APPLICATION AND CONSTRUCTION.

We now come to treatment of cases of fracture in which the tendency to displacement is considerable, double or

Fig. 9.

Metal mandibulo-maxillary splint.

multiple fractures, fractures in cases where the teeth are few in number and in poor condition, and fractures of the angle and ramus of the jaw behind the teeth. These forms are all best treated by means of the intermaxillary or mandibulo-maxillary metal splint, which fixes the lower to the upper teeth in their natural position with the jaws closed. In some cases, where there is great pain and tenderness immediately following the injury, it is well to wait a day or two, to allow these symptoms to pass off, before taking the impressions. Impressions of both lower and upper teeth should be taken in plaster. Some cases present considerable difficulty in obtaining a good impression. This can often be facilitated by having a smooth impression tray, and oiling it, so that it will easily separate from the plaster. The plaster can then be cut or broken and

removed in several pieces. The lower cast is cut and readjusted to articulate correctly with the upper, and a metal cap is swaged to cover the lower teeth, in the same manner as described for the single splint. A similar cap is made for the upper teeth, and the cutting-edges of the two are ground down until the upper and lower teeth come into correct occlusion. The upper and lower caps are then soldered together. (Fig. 9.) The splint is now ready for insertion in the mouth. In cases with much displacement, it may not be possible or advisable to force the splint completely into place at once; but by adjusting the cap correctly to the upper teeth and bringing the lower teeth approximately into place, the lower jaw in twenty-four or forty-eight hours can be gradually forced home by pressure of bandages, on the principle of a double inclined plane. Slow reduction in this way is preferred to rapid reduction under an anesthetic, as the danger of strangulation from post-anesthetic vomiting with the jaws closed is thereby avoided. When reduction is complete, the splint can be removed and cemented to the upper and lower teeth, and left in place until union is firm. The question is often asked, How does the patient obtain nourishment with the jaws fixed in this closed position? In many cases there are spaces left by teeth that have been lost, but even in patients with full dentures, I have never yet seen one where it was necessary to sacrifice a tooth to make room for food to pass. Sufficient liquid nourishment can always pass around back of the third molars in the spaces between them and the rami of the jaw. The mouth should be kept as

Fig. 10.

Radiograph of case shown in Fig. 4, previously treated with Lane's steel plates. Mandibulo-maxillary splint in position.

clean as possible when the splint is worn, the most satisfactory mouth-wash being a 1 : 3000 solution of potassium permanganate. The splint just described may be more difficult and require more time to make than the old vulcanite appliance, but its advantages far outweigh these considerations. In fractures of the ramus and angle, posterior to the teeth, the mandibulo-maxillary metal splint is the only satisfactory form of treatment. (Fig. 5.) In these cases we have no means of fixing the fragments one to the other, so we do the next best thing, *i.e.* attach the largest fragment by means of its teeth in correct relation to the upper jaw. The posterior fragment, though not artificially fixed, can be disregarded, as X-ray studies have shown that it tends spontaneously to assume a correct position in relation to the anterior fragment, and in any case our aim is to preserve the proper occlusion of the teeth, which can be done only by means of this splint, with the teeth closed. Angulation at the seat of fracture is thus avoided.

In fracture in the region of the teeth, where teeth are missing, where displacement is great, or in multiple fractures, the mandibulo-maxillary metal splint affords greater stability—insuring correct occlusion—than can be obtained with the mandibular splint alone. (Fig. 10.)

I have not attempted to go into the symptoms, diagnosis, complications, and other points involved in fractures of the mandible, but hope that this brief consideration of various methods of treatment will be found of sufficient interest to arouse discussion of other points.

SUMMARY.

The following is a summary of the views expressed above:

Operative treatment of fractures of the mandible by employing wires or bone plates cannot secure adequate fixation nor the meticulous accuracy of adjustment of fragments essential to good occlusion of the teeth. It, moreover, invites infection, and leaves unsightly scars on the face.

Whenever possible, cases of fracture of the lower jaw should always be treated with some form of interdental splint. Other methods of fixation, as by bandages, wiring the teeth, etc., should be reserved for emergencies in which the aid of a dentist cannot be obtained.

For fracture of the body of the mandible with several sound teeth on each side of the break and without much displacement, undoubtedly the best method of fixation is by means of the metal mandibular splint, which permits of opening and closing the jaws for cleansing, mastication, etc. For all other fractures, *i.e.* of the body of the bone where teeth are poor and few in number, where there is much displacement of fragments, in multiple fractures, and in fractures posterior to the teeth where the posterior fragment cannot be fixed, absolute accuracy in adjustment can be insured only by means of the metal mandibulo-maxillary splint with the closed bite.

In conclusion, I believe that there are many opportunities for dentists who can devote a little time to this work, provided they are willing to give their services to hospital cases. The physician and surgeon give part of their time to poor people, and thus gain the reputation leading to better things. Why should not the dentist follow this unselfish example?

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

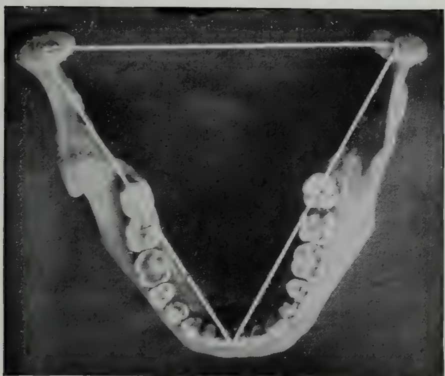
(I) HOW TO OBTAIN ACCURATE MEASUREMENTS IN ARTIFICIAL DENTURE MAKING. (II) LOCATING THE FUNDAMENTAL LINES USED IN ANATOMICAL ARTICULATION.

By W. C. DALBEY, D.D.S., Du Quoin, Ill.

THE principles of the several movements of the human jaw are now generally well known. Probably no further revolutionary discoveries will be made along these lines, but the writer thinks that there still remain some points of minor detail that may add to the fundamental and general principles in anatomical articulation.

Fig. 1 is a beautiful illustration of Bonwill's triangle, as applied to the hu-

FIG. 1.



man jaw. The Bonwill theory enters largely into the mechanism of the modern anatomical articulator, but only in Bonwill's average of four inches, as set forth in his theory.

The dentist who desires to accomplish the very best results must do more than work along average lines. But how this might be accomplished has been, in the past, a perplexing question. It is simple enough to measure the mandible of a human skull, but to get the exact measurements of the living human subject is quite another matter. It is surprising to see the marked difference in the measurements of the triangles of the jaws of different patients who present themselves

FIG. 2.

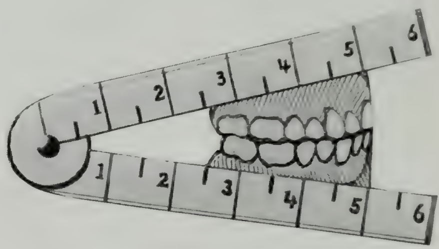
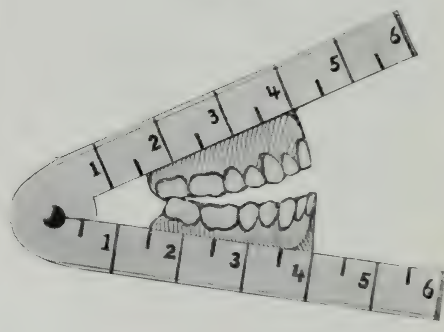


FIG. 3.



for artificial dentures. Not long ago, there came to my office a lady whose mandibular triangle measured three and one-half inches, and only recently a patient presented whose triangle measured almost five and one-half inches. How unreasonable and unscientific it would be to make artificial dentures for either of these cases upon an articulator which would allow for but a four-inch measurement.

Faulty articulation of dentures is exhibited in the mouth more often because the models upon which the dentures were made were incorrectly set upon the articulator, than owing to any other cause. Artificial dentures, made to articulate at a certain distance from the joint of the articulator, will not articulate at a lesser or greater distance when the bite is raised or lowered, or the distance from incisors to joints is changed. This is illustrated very graphically in Figs. 2 and 3. Fig. 2 illustrates the case of a

Fig. 4.

denture the incisors of which were set five inches from the joint of the articulator. Should this denture afterward be placed in the mouth of a patient in which the distance from incisors to joint is but four inches, the resulting incongruity, amounting even to ridiculousness, is shown in Fig. 3. Here it will be seen that only the last molars touch, though they do not occlude. And, further, should these same dentures be placed in a mouth in which the distance from hinge to incisors exhibits a greater distance than five inches, the opposite condition to the one shown in Fig. 3 would be the result, viz, none of the teeth would strike except the incisors.

Thus will be seen the importance of correctly reproducing upon the models and articulators the measurements of the patient's mandibular triangle.

The base line of Bonwill's triangle is supposed to be measured from center to

Fig. 5.

center of articulating surfaces of the condyles. This line, of course, cannot be secured in the live subject.

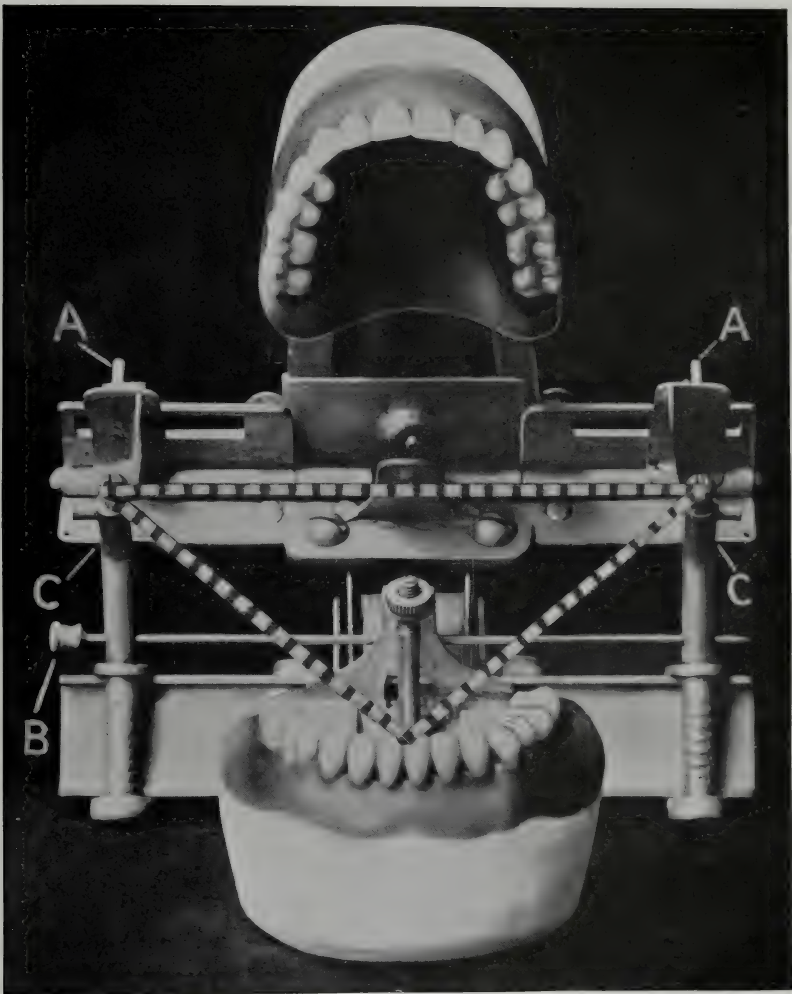
WHERE THE BASE LINE IS OBTAINED.

The writer has discovered that accurate measurements in every case may be obtained by measuring from points upon the ascending posterior border of

the rami at the necks of the condyles. This measurement is taken just behind the lower lobes of the ears—with specially made calipers having thimble points—by pressing snugly inward and forward upon the necks of the condyles. (See Fig. 4.) Fig. 5 shows clearly where the measurement is taken. This measurement is then transferred to the adjustable anatomical articulator. (See Fig. 6.) This line is therefore of the greatest importance, as it forms the base of the triangle upon which depends the accuracy in the construction of the artificial denture.

The writer wishes it to be understood that this triangle is not always an equilateral triangle. While he believes it absolutely necessary to take into consideration the correct measurement between the condyles, and that the articulator be adjusted to this condylar measurement of the patient, yet it is just as important to obtain a condyle-incisor

Fig. 6.



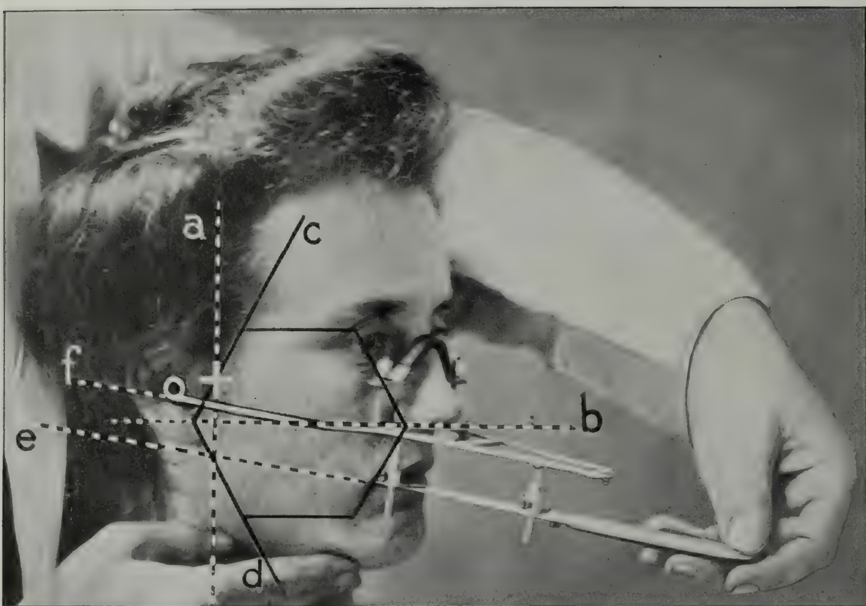
measurement, or rather, as will be shown in the following pages, an oscillating-point-to-incisor measurement. If one is of more importance than the other, it is the latter measurement. The object of this paper is to inspire greater accuracy, if possible, in triangular measurements for each individual case, regardless of whether the triangle be equilateral or otherwise.

II.

Locating the Fundamental Lines Used in Anatomical Articulation.

It is now positively known that the center of mandibular rotation does not lie in the condyles. I say the center of rotation, though I do not like the expression "rotation," because it is a misnomer. Rotation would signify an around-and-around motion from a common center. It seems to me that oscillation is the more proper word, as it conveys better the idea of a back-and-forth motion, like that of a door upon its hinges. Be that as it may, we will use the word oscillation instead of rotation, for it conveys better the idea of the actual motion of the human mandible. It is now commonly understood that the center of oscillation lies half-way between the articulating surface of the condyle and the posterior end of the occlusal plane, and back three-eighths of an inch from a line drawn perpendicularly through the condyle, and inwardly

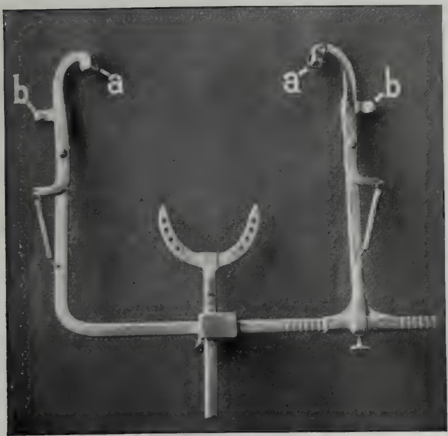
Fig. 7.



In Fig. 6, points A A show the pins upon adjustable artificial fossæ, which telescope holes in the center of the thimbles in the points of the calipers referred to. The line of occlusal plane is shown at B, and C C are the oscillating points, viz, the points situated in the human subject half-way between the occluding surface of the condyle and the posterior end of the occlusal plane and three-eighths of an inch back of a perpendicular line drawn through the condyle. The heavy dotted lines show the triangle scheme. Owing to the adjustability of this articulator, the exact measurements of every case can be reproduced.

toward the median line the same distance. (See Fig. 7, at point where lines *c* and *d* unite.)

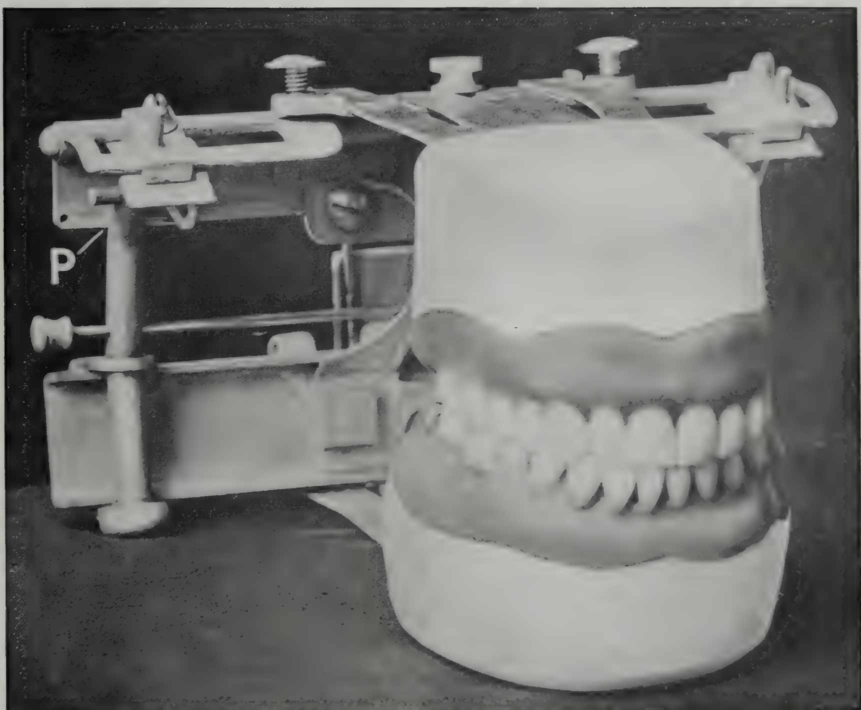
FIG. 8.



directly backward, when the head is naturally poised, passing at right angles through line *a* and past the said line three-eighths of an inch. This line is indicated in Fig. 7, *b*. As we will refer to this very important point, the center of oscillation, later, we deem it advisable to make its location very clear to the mind of the reader.

A line (*c*) drawn downward and backward, at an angle of 60° from line *b*, through the condyle, indicated by the white cross, will merge into the center of oscillation. And a line (*d*) drawn from the center of oscillation downward and forward, at an angle of 60° from line *b*, will intersect the point where line *a* crosses the occlusal plane (*e*). These two lines, *c* and *d*, form two sides of a perfect hexagon. The angle of this hexagon, opposite that shown at the center of oscillation, strikes exactly the lowest point of the ala of the nose.

FIG. 9.



To further locate the center of oscillation, a line may be drawn, beginning just beneath the ala of the nose, running

Another line that enters as an im-

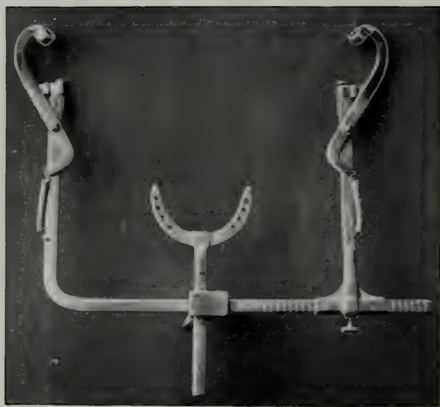
portant factor into anatomical articulation is the *predeterminate dental line* (*f*), so called because this line predetermines the position of the occlusal plane (*e*), which is parallel with this predeterminate dental line. In a widely circulated article upon anatomical articulation, we read—"That step is, to draw on the patient's face by the aid of a ruler, a line from the *lowest point* of

FIG. 10.

the external auditory meatus to the lowest point of the ala of the nose." The writer maintains that this is only partially correct. Beginning at the lowest point of the ala of the nose, running backward, this line should end at least one-fourth of an inch lower than where this author locates it. And should we begin to work out our compensating curves upon the line of the occlusal plane (which would, of course, be parallel with the predeterminate line) according to its position as set forth by this author, it would bring the posterior end of our compensating curve too high. Therefore we maintain, as we have said, that the posterior end of the predeterminate dental line should be one-fourth of an inch lower than where he locates it.

The occlusal plane gage, as illustrated in Fig. 7, was designed upon the foregoing theory, and locates these two lines precisely without the inconvenience of drawing a line upon the patient's face, which always becomes distorted when the patient opens his mouth, or of vaguely determining these lines by some other means, and precludes all doubtful results. For no line is of more importance than the exact line of the occlusal plane.

FIG. 11.



The writer has proved to his own satisfaction the correctness of his theory by placing the occlusal plane gage upon many subjects having perfect teeth, and the gage locates these lines exactly as heretofore stated.

Having thus located these lines, let us come back to the point of oscillation. The writer believes that this is the point from which the trial plates should be mounted with the face-bow, and not from the head of the condyle, as many practitioners contend. During his early experiments with anatomical articulation, while working out the rules laid down in the literature upon this subject, the writer wondered why it was, notwithstanding his carefulness in carrying out the rules, that he had to grind the molars more or less. He soon found that the distance from hinge to incisors was, nearly always, just a little short.

And when the dentures were placed in the mouth, the distance from hinge to incisors in the patient was a little shortened. This caused the back molars to strike first. While in many cases this discrepancy was only slight, yet it spoiled the exactness of the anatomical scheme. The point in question is clearly seen in Figs. 2 and 3, and fully discussed in the first part of this paper, where the importance of an absolutely correct hinge-to-incisor measurement is clearly demonstrated. It is to be understood that the writer means the measurement from oscillating point to incisor, which upon the anatomical articulator, shown in Figs. 6 and 9, becomes the hinge point. To remedy this, although it may be only a slight discrepancy at times, the writer has made what he calls *the center of oscillation gage.* This is a bow or gage which determines the correct distance from the center of oscillation to the incisors. In mounting the trial plates with this gage, the points *a a* in Fig. 8 are placed upon the patient at the point of oscillation. The trial plates are fastened to the mouth-piece in the usual way. The whole gage is then taken to the adjustable anatomical articulator. The points *a a* have holes which telescope pins upon the articulator at points designated by P in Fig. 9. In this illustration, P shows the point of oscillation. In this articulator the hinge, as heretofore stated, is at the center of oscillation. When placed upon the patient, as shown in Fig. 10, the points *a a* in Fig. 8 prevent the gage from being taken away from the patient. This difficulty is removed by *catches,* shown at *b b* in Fig. 8. These catches allow the instrument to open, as shown in Fig. 11. Then the instrument, together with the trial plates, slips away easily.

NASAL SPACE AND THE DENTIST'S RESPONSIBILITY.

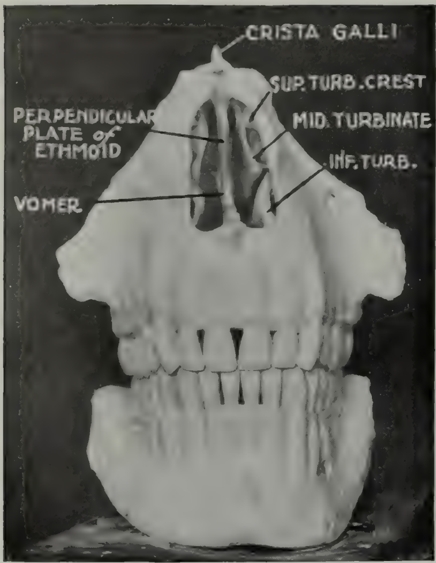
By Dr. J. A. CAMERON HOGGAN, Richmond, Va.

(Read before the Southern Branch of the National Dental Association, at its annual meeting, Old Point Comfort, Va., July 22, 1913.)

THE recognition of the true value of each card in a whist hand and a rapidly formed calculation of the value of the hand as a whole, is the secret of good whist; it means a mental picture of the hand as soon as the player takes up the cards. So it is with the study of the internal face. The relation of the bones is so complex that probably very few students of anatomy successfully get an accurate mental picture of the value, position, and relation of each bone in the skull. No better way exists of forming a correct picture than constructing, with our own hands, a model of the internal face and skull in some plastic material. It should be enlarged on a definite scale, so that we can trace with our hands the anatomical and, to a certain degree, the physiological functions of all the parts.

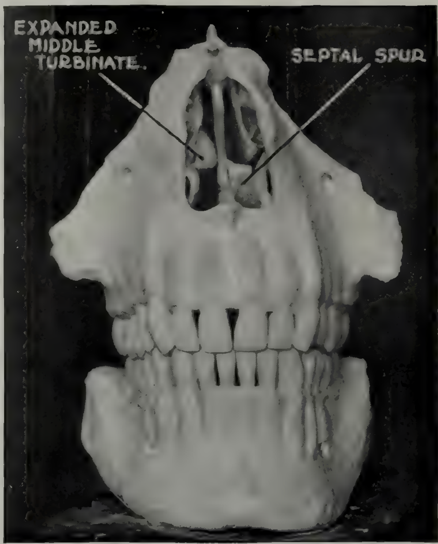
In Fig. 1 are shown, modeled in plaster of Paris, the principal bones of the face concerned in respiration. The upper central incisor of a particular skull was chosen as a type, and the model enlarged fifty times its size. The remaining twenty-seven teeth were carved to harmonize with this one tooth, and occluded normally, plaster of Paris being used to hold them in position. The mandible, as shown, was then formed in proportion to the lower teeth. The maxillary bones were next added.

Fig. 1.



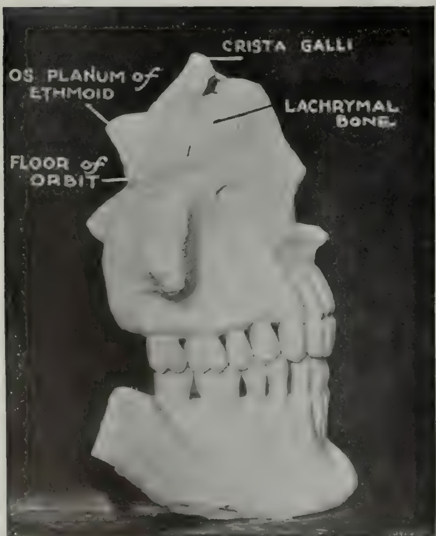
Anterior aspect, showing clear meati and the relation of normal occlusion to the bones of the face. (Model was 50 times normal size.)

Fig. 2.



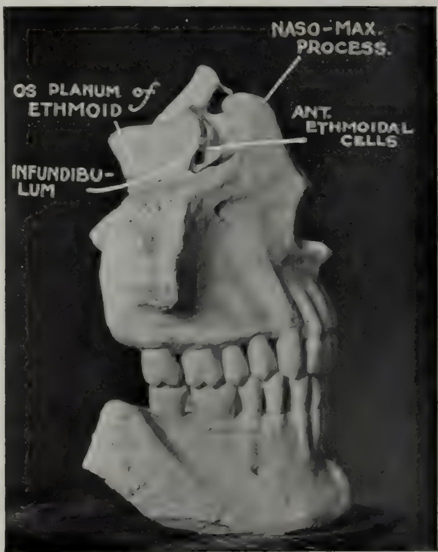
Anterior aspect showing nasal obstructions.

Fig. 3.



Showing balance of normal occlusion and lacrymal bone *in situ*.

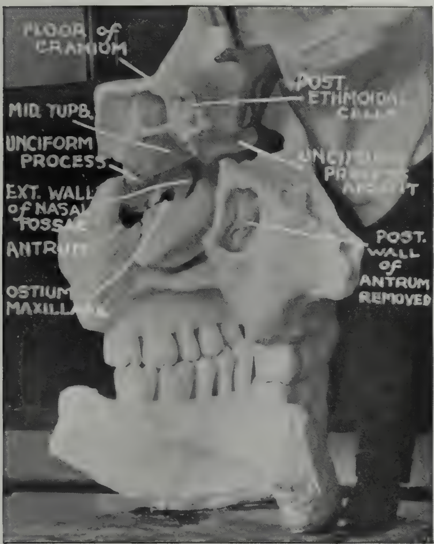
Fig. 4.



With lacrymal bone removed, showing anterior ethmoidal cells.

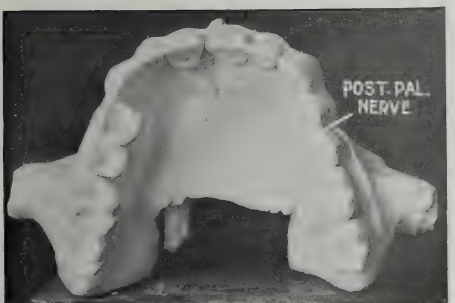
followed by the vomer, turbinates, lacrymal, and ethmoid bones, all in harmony and disarticulated.

FIG. 5.



Ethmoid bone raised from seat of articulation, showing the manner in which the unciform process comes down to meet the ethmoid process of the inferior turbinate to complete the outer wall of the nasal fossæ and the inner wall of the antrum.

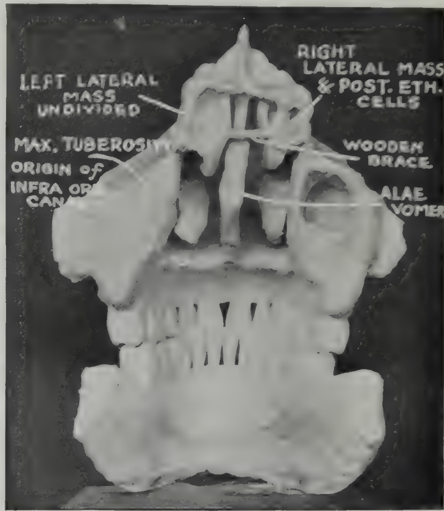
FIG. 7.



Showing cusp planes of occlusion.

The beauty of normal occlusion and the dependence of the bones named upon normal occlusion is clearly demonstrated. In association with malocclusion and undeveloped jaws we usually find abnormally formed bones in the internal nose. Let us place in this fully developed nasal space an enlarged middle turbinate, a

FIG. 6.



Showing posterior view of nasal space, right lateral mass divided into posterior ethmoidal cells, and left lateral mass undivided.

septal spur, and a spur on the inferior turbinate, and we perceive how greatly

FIG. 8.

Showing mandible as far as rami.

the normal channel for respiration is decreased in size. If we assume further a chronic inflammation of the mucous

membrane, hypertrophic rhinitis, adenoid tissue, or any of the pathological conditions of the membranous lining of the internal nose or naso-pharynx, and add again to these conditions an undeveloped nasal space, we obtain a good picture of the breathing apparatus of a child with a contracted upper arch.

I have seen occasionally undeveloped jaws with comparatively clear meati, and I have seen a dentist extract teeth with a clear conscience, but I have yet to see normal occlusion keeping company with a deformed nose. Orthodontia divides humanity into two great classes—those with normal occlusion and those without. When Angle gave to dentistry the orthodontia of normal occlusion, man made one great stride toward future perfection.

A PICTURE OF THE TYPICAL MOUTH-BREATHER.

Let us consider briefly a hypothetical case. A young mouth-breather of fifteen years of age is just out of school. He comes panting home to dinner a little behind the others. He is not strong, and there is a dull, sullen anger in his eye; to him, this has been a bad morning. It is of no use, he cannot get along at school; with memory dull, eyes weak, hearing poor, he cannot study. Is it strange that he rebels, and looks with anxious, envious eye at the seat on the butcher's cart? This chill November day, as he runs along, a passing streetcar raises a cloud of dusty filth; he tries to avoid it, but the short, sharp gasps come so frequently that he cannot save himself, and he lines his mouth, throat, and lungs with a nice coating of this dusty filth. Of course it is not any worse than any other city dust; it merely comes from the road, the place in which we are asked to expectorate.

On his arrival home, his mother, seeing the pale, anemic face of her boy, thinks he does not look strong. He is thin, he should have more meat, and she gives him a large portion of the steak; but with nose blocked, sense of smell gone, he cannot taste it, cannot enjoy it, so he must have more condiments and pickles. These he is given. He eats quickly, does not seem to relish his meal, indigestion ensues, and constipation results.

The chill, discouraging days of autumn; the slow, insidious cough of winter; the long-delayed visits to the physician; removal of the adenoids or the operation of tonsillotomy—are the natural sequence of events in the next six months. Now comes the assurance from the physician that the boy will get well, *but*—and here the physician pauses—he must give up the habit of breathing through his mouth—he must learn to keep his mouth closed; and the boy is launched forth with stimulated hope, with a cleaned, clear nasal passage—but to struggle in a hopeless fight. It is a physiological impossibility for that boy to keep his mouth closed over his teeth.

It is a recognized fact that rhinology today looks to dentistry for aid in establishing normal breathing. By stimulating the growth of the bones and widening the upper arch, the floor of the nose is enlarged. The meati are enlarged, septal curvatures are modified, and restored function encourages growth of the nose. We who are custodians of the mouth are also responsible for the condition of the nose. It is self-evident, therefore, that we should guard against the formation of spurs, enlarged turbinates, and pathological conditions, by bringing about normal occlusion as soon as feasible, instead of waiting until the full complement of teeth erupt. This is a question that has to be discussed with almost every patient who presents himself to the orthodontist. Mistaken impressions on the part of the patient are bound to occur if there are conflicting opinions between the dentist and the orthodontist in regard to age.

Thus orthodontia has broadened the field of dentistry, and has greatly contributed to human health and happiness—which should be gratefully acknowledged.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

CAVITY PREPARATION FOR INLAYS.

By ALFRED R. STARR, M.D., D.D.S., New York, N. Y.

(Read before the Kings County (N. Y.) Dental Society, October 9, 1913.)

IN cavity preparation for inlays of any kind, we follow about the same general rules as in the preparation for fillings; viz, in simple pit or fissure cavities we extend to the ends of the fissures or until a smooth margin can be obtained, obtain a flat base with the side walls slightly flaring instead of rectangular, and get the proper enamel bevel. In complex fissure cavities, we aim to get correct outline, resistance, retention, and convenience forms in much the same way as for fillings.

PORCELAIN INLAY CAVITY PREPARATION.

For a porcelain inlay the cavity should be of medium depth, neither too deep nor too shallow, and should have sharp marginal outlines. Too deep a cavity increases the difficulty of getting a good matrix or impression, while a very shallow cavity complicates the color problem, and endangers the retention of the inlay. The cavity for a porcelain inlay should have a distinctive form or outline, so that there will be no difficulty in determining at a glance just how the inlay should be placed in the cavity. If the cavity is nearly circular in outline, or has not some irregularity of floor or outline which will furnish a definite guide as to the way the inlay must be placed, we should make a mark, with pencil or ink, at some point on the surface of the inlay to enable us readily to determine its correct position when setting it in the cement. Neglect of this precaution will sometimes cause considerable delay in setting the inlay and perhaps necessitate its removal and resetting, if the cement crystallizes too quickly. This may be a serious handicap, for it is no easy matter to thoroughly remove the cement from cavity and inlay without danger of disturbing the margins. Any marked beveling of the outer cavity margins is contra-indicated in the preparation for a porcelain inlay, since such margins would not be sharp enough to give a clear impression, and would necessitate thin edges of porcelain in places where they may be exposed to severe stress.

If any beveling is resorted to, it should comprise the entire wall of the cavity, or the entire enamel wall, and not the immediate cavo-surface angle. Beveling the entire cavity wall or the entire enamel wall may assist in neutralizing the effects of shrinkage and enable us to show less cement at the margins, since the removal of the platinum or gold matrix will allow the inlay to sink deeper into the converging cavity walls and give us closer adaptation.

Cavities for porcelain inlays should be prepared with a view of securing safety margins in the same way as for fillings, and the resistance and retention forms should be well considered. It is a mistake to say that a cavity for a porcelain inlay should be devoid of undercuts or retention grooves; they are indicated in large cavities, especially where contour has to be restored, with the understood proviso that the grooves must be made in such locations or directions as will not interfere with the withdrawal of a matrix or impression.

With porcelain, as well as with gold inlays, I believe we usually obtain better adaptation to the cavity walls by the direct than by the so-called indirect method; but by taking an impression of a cavity and swaging a matrix di-

rectly over that impression—instead of swaging it into a model made from the impression—it may be possible to secure a closer fit than by the direct method. In following this plan, the impression should be taken with cement or some very hard compound which will not yield readily to the force necessary to properly swage a matrix over it.

GOLD INLAY CAVITY PREPARATION.

In the preparation of cavities for gold inlays, we may make rather sharper angles in the interior than we would for porcelain, and should so arrange the cavity that the inlay will be mechanically retained, independently of the cement. Inlays held in place simply or solely by reason of the adhesiveness of a cement are apt to fail in a comparatively short time.

Removal of overhanging walls. The first step in the process of cavity preparation consists in removing overhanging or frail walls.

Removal of carious dentin. We next remove the soft or carious dentin, in order to ascertain the full extent of the decay. Dr. Black, in his work on operative dentistry, makes this the fifth step in cavity preparation, placing it after the securing of proper outline, resistance, retention and convenience forms, although he states that under certain conditions it should follow the preparation of outline.

In some instances the removal of overhanging and frail walls will produce an approximately correct cavity outline, but not always, so I prefer to make the removal of carious dentin the second step in the operation, or, in other words, immediately after the removal of overhanging walls, in order to determine as soon as possible whether the pulp is involved.

I prefer this plan, because there are cases where an anesthetic or analgesic may be contra-indicated, and in such cases, if the pulp is involved and has to be removed, the other steps in cavity preparation can be postponed until after the tooth is devitalized, when they may be accomplished with much less discomfort to the patient.

Outline form. The next step would be the securing of proper outline form, which includes "extension for prevention" as recommended by Professor Black. In pit or fissure cavities, this simply implies extending to the ends of the grooves as already stated, but in smooth-surface cavities, there are other points to be considered, the idea being to endeavor to place the cavity margins in zones of comparative immunity rather than in zones of susceptibility. In cervico-facial cavities, it means extending mesially and distally to near the proximate angles of the tooth, gingivally to beneath the free margin of the gum, and morsally to near the point of greatest convexity of surface. We extend mesially and distally toward the proximate angles, because we know from clinical experience that the carious process rarely goes beyond those lines, and we extend beneath the free margin of the gum for the same reason.

That portion of the facial surface of the tooth which lies morsally of the point of greatest convexity is supposed to present a certain amount of immunity, because it is a little better cleansed by the friction of food than is the part lying gingivally of that point.

In proximate cavities we must also, except in cases of considerable recession of the interproximate tissues, extend to the free margin of the gum, especially at the cervico-lingual and cervico-facial angles. We should extend morsally to beyond the contact point, and facially and lingually well into the embrasures. Fortunately, proximate inlays require rather broad cutting of the cavity, in order that the walls may be made parallel or slightly flaring to permit the easy withdrawal of the core or impression, and this brings the lateral margins of the cavity into zones of safety.

The demand for "extension for prevention" is greater in the case of gold inlays than of gold fillings, since the protecting layer of cement tends to diminish thermal shock and pulp injury.

I am at the present time a firmer believer in "extension for prevention" than I was some years ago, for I have had its advantages impressed upon me by clinical experience. In my earlier years of practice, I was frequently called upon to repair or replace fillings on proximate surfaces which had become defective because of close contact with neighboring teeth. In these cases where I had been ultra-conservative in saving tooth structure and had not cut the cavity margins into zones of comparative immunity, after repeated repair or replacement of fillings those cavities finally attained an area consistent with the ideas of extension for prevention, and recurrence of caries was prevented or very much retarded.

I was not farsighted enough to appreciate how or why these results were attained, and perhaps never would have reasoned it out, if Professor Black had not solved the problem for us. While appreciating the advantages of extension, I nevertheless realize its shortcomings, and am not radical enough to advise its practice to the fullest extent in all cases. I believe that we must be guided in a great measure by the age of the patient, the tendency to susceptibility or immunity, the condition of the nervous system, the sex and occupation of the individual, the general tone of the pulps of the teeth, the location of the cavity, the shape and environment of the teeth, the condition of the oral secretions, the patient's care of the mouth, esthetic considerations, and perhaps still other factors, in deciding whether or not to make full extension in any individual case.

I am not going to dilate upon the reasons why these factors should be taken into consideration in influencing one's method of practice in regard to this step of cavity preparation, as every practitioner can figure it out for himself, but perhaps I ought to explain my reasons for this sort of conservatism. I do not believe that the pulp has outlived its usefulness in a tooth which is fully formed, and in which the pulp may be diminishing in size because of secondary dentin formation. I believe the pulp has important nutrient functions to perform even in that stage, but even though we grant that it has no useful purpose, I would still do all I could to conserve its vitality, because of the many difficulties to be encountered in its extirpation and the subsequent root-canal treatment.

In these days of analgesia and comparatively safe local anesthesia, the painfulness of the operation of cavity preparation is perhaps a negligible factor, but the subsequent sensitiveness and possible permanent damage to the pulp by the more radical operation are factors which should not be overlooked. The exposure of a larger area of vital dentin with its sensitive fibrillæ is bound to result in greater reaction on the part of the pulp.

In this connection let me caution against the practice of introducing a permanent filling material, or even an inlay, immediately after the preparation of a cavity under analgesia or local anesthesia, except in very superficial cavities.

If he follows this rule, the operator will save his patient considerable pain, and himself some annoyance. I will not be overstepping the bounds of conservatism when I say that cavities should invariably be extended to the so-called safety lines, in case the margins come at all near those areas.

Resistance form. The next step in cavity preparation is obtaining the proper resistance form. In many cavities this does not require consideration, but in others it is very important. The strength of the "bite" is ascertained by noting the effect on fillings, or on the occlusal surfaces of the teeth, as advised by Dr. Conzett. A good seat is to be obtained for the inlay, especially in complex cavities. In proximate cavities in anterior teeth involving the incisal edge the lingual or incisal extension is practiced, and in posterior teeth we should make a strong occlusal step with a flat base, or one slanting toward the pulp at the end farthest from the proximate portion of the cavity.

The proper resistance form implies a preparation which will tend to prevent

the inlay from slipping from the cavity or pulling away from the margins under the stress of mastication. In proximo-morsal cavities this implies a rather broad gingival seat cut well into the dentin, with facial and lingual walls almost parallel and meeting the seat at nearly right angles, while the axial wall should meet the other walls as nearly as possible at right angles. It implies also the formation of a step or extension, incisal, lingual, or occlusal, which will be of sufficient depth or width to secure the inlay against the stress of mastication.

The side walls of cavities should come as near as possible to forming right angles with the floor or deeper parts, without danger of interfering with the withdrawal of the core or impression. This plan is necessary in order to take advantage of the elasticity of the dentin with a closely fitting inlay, and also to afford greater mechanical resistance to displacement.

Retention form. The retention form of a cavity is in great measure taken care of in the resistance form, but not entirely.

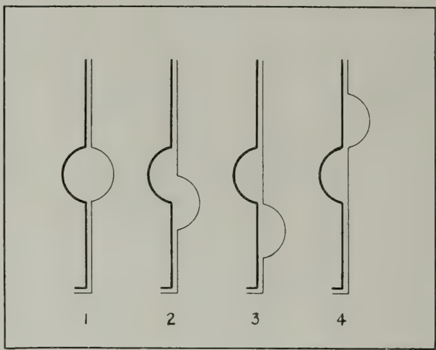
Dr. Conzett, in an article on gold inlays, says, "The resistance form is that which tends to resist the thrust forces which are brought to bear on the inlay, while the retention form is more particularly that which has to do with the forces which tend to pull the inlay out of the cavity."

The retention form is obtained by grooves, depressions, dovetails, mortises, curvatures, or inclinations in such situations as to resist best those extraneous forces and to interfere least with the impression of the cavity.

In a paper of this length, it is manifestly impossible to go into detail in regard to the different methods of retention, but I would like to call your attention to a few points in regard to undercuts in inlays and cavities which have been brought out by Dr. H. W. C. Bödecker in his book on "The Metallic Inlay." Dr. Bödecker states that in using undercuts for the retention of inlays, the undercuts in the inlay should be, if possible, directly opposite those in the cavity in order to best take advantage of the compression strength of the cement. In considering the advantage of undercuts for retention, Dr. Bödecker claims that the strength of the anchorage depends upon the thickness of the cement in the opposing undercuts, and the amount of crushing stress it will stand. He contends that the resistance offered by the compression strength is much greater than that offered by the tensile strength of the cement, and that the strongest anchorage can be obtained by getting the undercuts in accurate relationship, as above stated.

In the accompanying diagram, patterned after Dr. Bödecker, we may observe the advantage of securing this apposition of undercuts. The dark lines represent an inlay, the lighter ones the cavity wall, and it is evident that the farther away the undercuts in the inlay are from those in the cavity wall the less we are taking advantage of the compression strength, and the more we are depending upon the tensile strength and adhesiveness of the cement. Dr. Bödecker admits the difficulty of getting the undercuts in exact apposition, and says the same results may be obtained by a further or more general excavation of the cavity walls, thus thickening the layer of cement and obtaining a more uniform distribution of pressure.

Diagram.



If Dr. Bödecker's premises are correct, it is manifest that such an anchorage as is represented in Fig. 1 would be much more effectual than those represented in

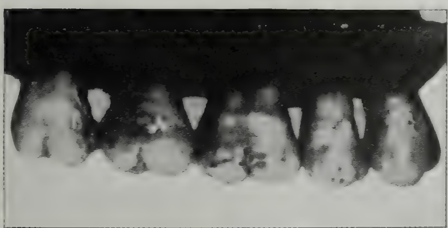
Figs. 2, 3, and 4. In Figs. 3 and 4, the undercuts are comparatively useless, since the cement in the cavity undercuts will not adhere well to the smooth inlay, and that in the inlay undercuts will not

Fig. 1.

get much bearing on the straight cavity wall. While this may be more theoretical than practical, it certainly seems worthy of attention.

Convenience form. Convenience form in connection with inlay cavity prepa-

Fig. 3.



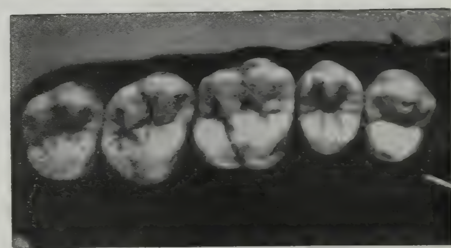
ration is of less moment than in the case of fillings, but it implies shaping the cavity in such a way that we can get best access to it for the purpose of taking the impression.

Beveling margins. The last step in the process is the shaping of the cavo-surface angles, and this is a subject which has excited considerable controversy. There is no question as to the advisability of beveling margins so as to remove all unprotected enamel rods. The only question is, whether to bevel the entire enamel wall or only the cavo-sur-

Fig. 2.

face angle. Dr. Conzett advises beveling the entire wall so as not to leave any thin margin of gold at the surface. Others claim that this thin margin is desirable in order that it may be burnished down to protect the cement and enamel, and afford closer adaptation. In a porcelain inlay there is no doubt as to the objectionable features of a marked cavo-surface bevel, but in a gold inlay I see no objection to it, provided the

Fig. 4.



beveling is sharp and distinct, without any rounded margins.

A very thin edge of gold at the margin would be disadvantageous, but a slight amount of beveling at the cavo-surface angles gives an edge of gold which can be burnished to closer adaptation without being thin enough to curl up and

pull away, or wear away, from the margins under stress.

In following this method, care should be taken not to do the burnishing after crystallization of the cement. While it is not exactly within the scope of my subject, I desire to say a few words in regard to inlay impressions, contact points of fillings or inlays, and the comparative value of fillings and inlays.

IMPRESSION METHODS.

We are advised by some to take our inlay impressions by the indirect method, using a model and bite mounted on an articulator, in order that we may more easily study the occlusal relations in restoring cusps and depressions on the morsal surface of an inlay. This method has its advantages, but is open to objections. I do not believe that we secure as perfectly fitting an inlay in this way as by the direct method. With either method we meet with difficulties because of the liability to change of shape of the wax core, the investment material, and of the gold, but with the indirect method the process is also complicated by the shrinkage or expansion of the impression compound and of the amalgam or cement of which the model is made. While appreciating the advantages of correct occlusion and the difficulties of obtaining that feature by the direct method, I consider accuracy of adaptation to the cavity and proper contour of greater importance than the finer details of occlusion.

PROXIMATE CONTACT.

Dr. Black and his followers teach us to make the contact points of proximate fillings or inlays in such a way as to imitate the contact of two spherical bodies, but I do not believe that this plan should be followed in restoring proximate contact between molars, or between bicuspids and molars.

In these situations we should follow nature's plan and make the contact rather broad from facial to lingual, while keeping it narrow in the morso-gingival direction. That this is nature's plan can easily be determined by an examination of any normal or nearly normal arch, using floss silk for the purpose of measurement. A piece of floss is carried into the interproximate space between molars, or between a bicuspid and molar, getting it beyond the contact points, then the two ends are pulled upward in the lower jaw, or downward in the upper jaw, holding the strands parallel, and the width of contact is noted as shown by the imprisoned loop of floss. The ends are then turned outward toward the facial, and, getting the strands parallel, the closer approximation of the ends is observed because of the narrower contact of the teeth in this plane. (See Figs. 1 and 2.) That this is the natural conformation of those teeth is conceded by Dr. Black, for in his book on "Operative Dentistry" we find diagrams illustrating the more rapid spreading of caries in a facio-lingual direction on the proximate surfaces of bicuspids and molars, and this method of spreading, he says, is due to the broad contact, or areas of close approach of those surfaces in that plane.

The diagrams of normal contact shown are taken from Dr. Black's book. (See Figs. 3 and 4.) I have frequently found it necessary to alter the facio-lingual proximate contacts of fillings or inlays where they have been made narrow instead of broad in that direction, and injury to the interproximate tissues has resulted. In such cases, when the contact is restored in the natural way, the interproximate tissues will usually return to a healthy condition, and further recession will be prevented because of the better protection afforded to those tissues. The restoration of proper contact and occlusion also helps to keep the teeth in proper alinement in the arch.

COMPARATIVE VALUE OF INLAYS AND FILLINGS.

In regard to the comparative value of fillings and inlays, each method has its sphere of usefulness, and it does not seem likely that the gold inlay can entirely eliminate the gold filling.

There are some small cavities, or cavities of irregular shape, the preparation of which for inlays would require very extensive cutting, or necessitate the use of compound inlays or perhaps a combination of a filling with an inlay, and yet such cavities could be readily filled with gold with no more trouble to the patient or operator, and with greater prospects of permanent success.

A NOTE ON NOMENCLATURE.

In this article, when referring to the different surfaces of the teeth, I have used the term "morsal" more often than "incisal" and "occlusal," and the term "facial" rather than "labial" and "buccal." I prefer the terms morsal and facial rather than their synonyms, because they seem to meet the requirements of description, and tend to simplify the nomenclature. It would not be absolutely correct to speak of the occluding surfaces of the posterior teeth as incisal, or of the cutting edges of anterior teeth as occlusal, but it seems perfectly proper to call each of them morsal or biting surfaces.

The cutting edges of the anterior teeth are the first to come in contact with the food in the act of biting, although the completion of the act is accomplished by the impact of the cutting edges and facial surfaces of the lower teeth against the lingual surfaces of the upper ones.

The labial and buccal surfaces are so named because they lie nearest to the lips and cheeks; but as the lips and cheeks are parts of the face, I can see no objection to using the single term facial, which will apply to both anterior and posterior teeth.

I am pleased to note that the term "palatine" is becoming obsolete, and that most authors use the term "lingual" in describing the inner surfaces of either upper or lower teeth.

Dental nomenclature is sufficiently complex, and I am decidedly in favor of simplifying it as far as possible.

THE SALIVA AND DENTAL CARIES.

By **RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.**

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, June 24, 1913.)

THAT we are today but little wiser than the ancients as to the prevention or control of caries, that greatest of dental diseases, should be to us, as a profession, a matter for chagrin. We have busied ourselves in perfecting our technique of replacing tooth tissues which have been destroyed by the ravages of caries, and because of the high state of efficiency which we have attained we have become necessary to the economy of the world and have been given a place among the learned professions. But during this growth of mechanical skill we have made but little progress toward the comprehension of the factors which control or determine the occurrence of caries, nor do we know how these untoward conditions may be rectified. For this we have been criticized by our *confrères* in the medical profession, and others, but when we review the work of scientific men in both dentistry and medicine who have in past times applied to caries every known form of research, and when we consider the investigations which are now being pursued with earnestness and zeal, we feel that we have demonstrated the magnitude of the problem, and have shown our

good faith in the pursuit of its solution.

MEDICAL PROBLEMS UNSOLVED.

And although medicine, our elder sister, has solved many of her difficult problems after long and continued effort, she still has remaining today many unsolved questions which are of as much import to her and to the world as is that of caries to us. The cause and control of cancer is today as unknown as ever. True, there are theories and practices which seem to fit some specific cases, but the prophylaxis and certain cure of malignant growths is far from being attained. And well may we take courage in the pursuit of our great problems when we consider the long and fruitless search which medical men have made to stem that scourge of humanity—the "great white plague." Can it be possible that their quest shall be consummated in that "mock-turtle soup," which so lately has been purchased for $125,000 and stock?

But to return to dentistry, our admission that we have not as yet attained the object of our scientific search, and have no world-startling results to announce, is not saying that we are standing still. We are progressing, for the work of every man, that has been carefully done, has advanced the sum of our knowledge, and has given added impetus to all others who are engaged in the study of the problem. So that today, when there is perhaps more interest in this subject than ever before, we are making great strides, which must surely bring us to a fuller understanding of this great question. Much benefit may be obtained by the comparison of ideas for the purpose of criticism and correlation, and nowhere can this be done so well as before an interested and intelligent audience such as is gathered here today. This, then, is a clearing-house of ideas, and I present to you gentlemen my note, even though it may be returned to me as "protested."

PRESENT KNOWLEDGE OF DENTAL CARIES.

It is to Miller, Black, and Williams that we owe our knowledge of the *modus operandi* of the carious process. They have determined for us that bacteria are the active agents, which bacteria are the common mouth varieties, having the property of producing acid when acting upon carbohydrates; this acid, when confined against the tooth, destroys the enamel by simple decalcification, and in this manner the process of caries is inaugurated. These results stand today uncontested, and are generally accepted as the true explanation of the process, but when we carry the proposition still farther, and ask why one tooth, or one set of teeth, should be subject to caries while another is not, we unfortunately have no such definite information. It is, then, this search for the variable factors which determine the immunity or susceptibility of the teeth to caries that is engaging the attention of the investigators of today.

You will remember that at first the strength and inherent resistance of the teeth was looked upon as a criterion of susceptibility. When Dr. Black published, as the result of his researches, that in his opinion the hardness or softness of a tooth had nothing whatever to do with its susceptibility to caries, he brought down a storm of protest from clinical men the world over, but as nothing has appeared which invalidates his statements, they still stand as they were written. And it is pretty well considered that although it may be possible for the structure of the tooth to enter into the question to a certain extent, it is not looked upon as being responsible for the sudden and obscure changes in susceptibility, except by those few believers in the mutability of the tooth in response to general physiological change. So that investigation today is being focused upon the environment of the tooth, the saliva, ingested food, etc., seeking in them the changeable element which determines caries.

SALIVARY ANALYSIS.

And confined to the saliva, as we are, for the pursuance of our investigations, we are given a very severe handicap, for we are dealing with a secretion about

which there is less known than of almost any body constituent. As we search through the medical and chemical literature we find little or nothing upon the saliva, and no help may be had from these sources. Then, when we essay to make our own investigations, we find that we have to deal with an unstable and changeable fluid that seems to resist our endeavors at every turn. It is not like the urine, which has gone through the furnaces of the body and been burned to residues that are stable and comprehensible, but it is rather the mixture of three different secretions, each of which is a living and changeable fluid manufactured by the body to be a part of the digestive process. So that we are dealing not with a chemical or physical problem alone, but one that is biochemical in its nature, and which multiplies our difficulties. In addition to these properties of the saliva we have to deal also with a great multiplicity of constituents which may be continuously or occasionally present, some of which may interfere with reactions which we may wish to use. Whenever a chemist is asked whether a given chemical reaction will take place, his query is always, "In the presence of what?" And there 's the rub, for who can say that he knows all the materials with which he is dealing in any given saliva? So serious is this interference in chemical reactions that it is truly impossible to say with certainty that even the simplest of reactions which we employ are trustworthy.

UNRELIABILITY OF INDICATORS.

This has been called to my attention with great force in the past few months in regard to that basic test which we make upon all salivas to determine their acidity or alkalinity. In much of the work which was done upon the saliva in earlier times litmus was the indicator used, and from the results thus obtained many conclusions were drawn. It was in 1907 that Dr. Kirk first pointed out the fallibility of the litmus test, in an editorial entitled "The Amphoteric Reaction."* He showed that both the alkaline and acid prosphates of sodium and calcium could be present in the saliva at the same time and not be able to neutralize each other, while still one of these salts by its presence might obscure the reaction of litmus with the other. So that he did not consider the litmus test as trustworthy for the most common acid and alkaline principles normally found in the saliva. He might have added that litmus was useless for the detection of many organic acids—among which is lactic, the acid with which we are so much concerned. And then, too, litmus reacts to CO_2, that gas which is ever present in fresh salivas, and which would interfere with the titration of other acids and bases; so that all recent observations have been made with some indicator other than litmus.

Of these, the one that has been the most used in biological chemistry, and which has found a very wide acceptance among salivary workers, has been phenol-phthalein. This is a valuable indicator which is very sensitive to weak acids, having a sharp end-reaction, and less so to weak bases. Unfortunately for our work it is sensitive to CO_2, and is seriously interfered with by the presence of ammonia. To overcome these objections Dr. Pickerill, who has done considerable work in the saliva, has made use of methyl-orange as an indicator, but it has the fault of being insensitive to weak acids, and of not having a sharp end-reaction when used in the saliva. Therefore phenol-phthalein is perhaps the most useful salivary indicator which we have at our command, and is the one which has been used in the work reported in this paper.

In the latest scheme for salivary analysis suggested by the Scientific Research Committee of the National Dental Association, it was recommended that phenol-phthalein be used as an indicator and titration be made against NaOH to obtain the total acidity. This obviously would include the CO_2 of the

* See Cosmos for April 1907, vol. xlix, p. 404.

saliva, in which we are not concerned, and which would obscure the real acidity or alkalinity of the sample tested. It has been the custom, when wishing to expel the CO_2 from a sample of saliva, to boil for a varying length of time until in the judgment of the individual the fluid is CO_2-free. But we must all admit that the moment we bring saliva to a boil we have no longer normal saliva, but a very different compound which has resulted from the boiling. We know that the proteins, which are so prominent in the saliva, are coagulated and tend to precipitation on boiling. Furthermore, many amino-acids are split off from these proteins, having an alkaline reaction to the reagent. The average saliva is acid to phenol-phthalein when fresh, and if boiled, many of them become neutral or alkaline as the CO_2 escapes; but the longer we boil, the more alkaline it gets, and who shall say at just what point we have entirely discharged our CO_2, and where we begin to form alkaline decomposition products?

Another method of discharging the CO_2, and one which has been used entirely by the author of this paper during the past year, is that of passing CO_2-free air through the sample while warming the fluid to not over 50° C. This will discharge all uncombined CO_2 from a saturated solution in from five to ten minutes, and although even this low temperature may break up some loosely combined substances, still its effect is probably less than any other method which would be practicable for our purposes.

I have gone to some considerable length to explain the difficulties attending upon the estimation of acids and alkalis in the saliva, and have outlined a method which has much to commend it, and yet I believe that I can point out to you that even this is not a trustworthy test, and does not give us the true value of the combining properties of the saliva. I first noticed this fact when I added various acids to salivas which were originally acid, neutral, and alkaline, and invariably I found that in any case a considerable quantity of the acid had combined with the saliva, so that the resultant acidity of saliva and added acid was much less than the combined acid readings of each. I found that this property varied greatly in different salivas, some taking up much more than others. In a given sample the combining action varied with the amount of saliva used, in a direct proportion. It was not, however, dependent upon the concentration of the solids of the saliva, for when centrifugated the thin portion was as active as the thick. When 1 cc. of water containing 8.1 mgm. of lactic acid was put in 4 cc. samples of various salivas, it was found that the salivas had taken up from 30 per cent. to 63 per cent. of the lactic acid introduced. Somewhat similar results were obtained by using HCl with saliva. This property is not confined to saliva, but may be seen to a less extent in egg albumin. If, however, the saliva be dialyzed, it loses its property of combining with acids. As a check upon my results I made use of dimethyl-amido-azobenzene—which is extremely sensitive to small amounts of HCl. I found that I could add from 1 mgm. to 3 mgm. of HCl to 1 cc. of saliva before the indicator would detect its presence.

From this we see that the saliva has an alkalinity which is hidden to phenol-phthalein, and which is able to combine with acids introduced into it from without. Two possibilities suggest themselves to us: One that it is a weak basic salt to which phenol-phthalein is insensitive but which is indicated in all salivas by methyl-orange, and which is in loose combination—as shown by its disappearance in dialysis; the other that it is an amino-acid product of the proteins present. The second of these possibilities is in accord with what has been written in chemical literature concerning the absorption of chemicals by proteins. So that, one or both of these possibilities being true, we must admit that our present indicators when used in the saliva have a large margin of error, a correction of which should be made, if possible. It may be that we shall be forced to make use of electrolytic methods of determining the H and OH ions, but to whatever extent we are forced to go, let

us determine on some sane and trustworthy method of making this simple and basic test, in order that our results may be of value. If our future investigations of dental caries are to hinge upon salivary analysis, it is very essential that we establish the fundamental principles of that science at once.

The same difficulties which confront us in the estimation of the acidity and alkalinity of salivas are present to a greater or less extent in the determination of every salivary constituent. The relatively large amount of variable proteins, by virtue of the properties which are characteristic of them, certainly do interfere with the reactions which we attempt to bring about in the saliva, and indeed it seems very possible that these controlling or inhibitive factors which are present in varying degrees in different salivas may have a potent influence in the determination of the course of the carious process in the mouths in which they occur. In correlation to this we have the work done by Dr. Head, in which he has demonstrated the inhibitive action of certain salivas by which they reduce the power of a given acid to produce decalcification. This phenomenon is very aptly stated by Dr. M. L. Ward in a discussion of a paper by Dr. Low. He says: "I firmly believe that it is an innate characteristic of certain salivas, and of others at certain times, to be as much of a restrainer to the action of many reagents as a good lubricating oil would be." We have, then, before us the problem of first determining the characteristics of a normal, immune saliva, if such exists, and then we must know the respects in which the abnormal and caries-favoring secretion varies from the normal. When we have obtained this knowledge we may in an intelligent manner seek by dietetics and hygiene to correct the fault through the avenues of nutrition. It is greatly to be desired that those men who have contributed so largely to our knowledge of the saliva may continue their labors, and that through the agency of the N. D. A. Scientific Foundation others may be found who are well qualified to pursue these studies until we shall have arrived at a clearer understanding of the fundamental principles of this great question. The foregoing statement is not meant to discredit in any way the results of salivary analyses which have been made, for a great deal of valuable information regarding the process of caries has been attained by the methods which are in vogue today, and until further information is obtained we must use the best methods which we have, with a judicious allowance for error in technique.

The investigations which have been made upon dental caries may be summarized under three distinct heads, as follows: (1) The bacteria, and the substances which help or hinder their growth; (2) the food supply of the bacteria, and (3) those forces which tend to protect and confine the bacteria and their products, or, conversely, aid in their dissolution and dissipation.

INFLUENCES AFFECTING BACTERIAL GROWTH.

Under the first class we are reminded of the attempts to kill the active agent in this process and render the mouth aseptic, but it was very quickly recognized that such measures were impractical, and failed of their purpose; for the bacteria are more hardy than the tissues of the mouth, and could we destroy every one, it would be but a short space of time until they would appear again and propagate their species with incredible rapidity. So that the bacteria are always present.

Recognizing this fact, other observers have sought in the saliva some hindering substance which had the property of modifying the action of the bacteria. Notable among these have been the KCNS, the alexins, and other antibodies, which have been given considerable attention. And just recently we have an important contribution from Dr. Percy Howe, in which he claims to have found a more active fermentation in salivas containing a high phosphate content, and less in those having a preponderance of chlorids. The work that has been reported upon these phases of the subject is voluminous, and much of it

has been carried out with extreme care; yet the presence of such an inhibitive substance is still but problematical, and its relation to caries has not been established.

THE AUTHOR'S INVESTIGATION OF RATES OF FERMENTATION.

In the investigation of this question I have made a series of experiments which have been continued over the space of two years. In these I sought in both susceptibles and immunes to find salivas which would in their natural state undergo more acid fermentation in a given time, or refuse to form as much as the average, and to correlate these rates of fermentation to the susceptibility of the individual to caries. My method of technique was that of collecting 5 cc. samples of the whole saliva by allowing the patient to expectorate directly into a sterile test tube, and placing this tube immediately into an incubating oven to be maintained at body temperature for 24 hours. At the end of that time the sample was removed and tested for amount of acids formed. From the mass of results which I have acquired I find that all salivas invariably undergo acid fermentation. This fermentation begins very early in the time of incubation, and continues to increase up to a certain limit, which is reached in 12 to 24 hours. After this it seems as if it had used up all its available carbohydrate, and the acid production goes no farther. I found also that the amount of acid was variable, some forming twice as much as others, but the amount of acid produced from the natural saliva was so small as to seem inconsiderable in any case, and the variation did not in any way agree with the susceptibility of the patient. Furthermore, I found that if ½ gram of sterile bread was added to the salivas, they all formed from 5 to 10 times as much acid as they did in the clear state. So that these experiments, subject to criticism as they may be, seemed to indicate that the fermentation of the saliva is not so much dependent upon the variation of the bacterial flora, or their life conditions, as it is upon the amount of carbohydrate food present for their consumption.

TABLE I.—SALIVA AND SALIVA-*plus*-BREAD FERMENTATION.

Immunes:	CASE 1.	CASE 2.	CASE 3.	CASE 4.	CASE 5.	CASE 6.
Normal saliva	Al. 0.23	Al. 0.45	Al. 0.45	Ac. 0.20	Ac. 0.10	Al. 0.05
Incubated saliva	Ac. 0.20	Neutral.	Ac. 0.30	" 0.30	" 0.44	Ac. 0.40
Incubated saliva plus ½ gm. bread	" 2.75	Ac. 3.80	" 3.00	" 2.78	" 3.40	" 2.45
Susceptibles:	CASE 7.	CASE 8.	CASE 9.	CASE 10.	CASE 11.	CASE 12.
Normal saliva	Al. 0.20	Neutral.	Neutral.	Ac. 0.10	Neutral.	Al. 0.15
Incubated saliva	Ac. 0.50	Ac. 0.52	Ac. 0.20	" 0.90	Ac. 0.45	Ac. 0.50
Incubated saliva plus ½ gm. bread	" 3.00	" 3.40	" 3.90	" 3.30	" 3.00	" 3.00

Comparison of fermentation between clear saliva and same saliva to which ½ gm. of bread had been added, the reading given as equivalent of NaOH N/100 per cc.

FOOD SUPPLY AND FERMENTATION.

And this brings us to the second classification, that of foods. Since it is an acid fermentation of carbohydrates which we are considering, it is the carbohydrate foods with which we are concerned. Of these there are two main sources, the ingested foods and those secreted from the salivary and other mouth glands. The mixed diet which is so universal today

affords an abundance of carbohydrate food, portions of which may be retained in the mouth to give rise to acid fermentation. The amount which shall be retained is determined by the arrangement of the teeth, the thoroughness of mastication, the care of the mouth by the patient, the viscosity of the saliva, and all the forces of oral hygiene. And this in itself constitutes one of the most variable and controllable factors of caries.

Besides the ingested foods, there are two constituents of the oral secretion which have carbohydrate radicals, namely, mucin and glycogen. The first of these was studied by the late Professor Miller, and he reported that the fermentation of pure mucin results in alkaline products, the protein radicals predominating over the carbohydrate. He further stated that the mucin of phlegm secreted from the pharynx, and that of the buccal glands, has a much higher carbohydrate content, and when fermented yields acid. To the buccal mucin he accredited the food source for certain forms of cervical caries. In the light of this, it seems very possible that, under certain morbid conditions, the mucin of the oral secretions might take on a much more carbohydrate character, and furnish an abundance of food for the propagation of caries independent of other sources.

Dr. Kirk, in a recent series of articles, has been calling our attention to a statement made by the late Dr. Michaels of Paris, that the salivas of many susceptible individuals contained glycogen. Glycogen, as we know, is a product of carbohydrate metabolism, formed in the liver and given to the blood in small and definite percentages. He claimed that in excessive carbohydrate consumption, when the surplus of glycogen formed is being stored in the tissues, it is also secreted in the saliva. Dr. Kirk lays considerable stress upon this fact, and suggests that the salivas of such individuals are more conducive to caries because of the presence of the highly fermentable carbohydrate, glycogen, and upon this hypothesis he bases the opinion that such cases are amenable to dietetic treatment.

COMPARISON OF MUCIN AND BREAD FERMENTATION.

In the study of these two factors I have collected the mucin and solids of the saliva, have thoroughly washed them with distilled water, have reinfected, and incubated. The result was a neutral or but slightly acid solution. I then concentrated the solids of a number of salivas, taken from immune and susceptible individuals, and incubated in sterile tubes. The concentration of these was mucin and solids to liquid, 1 : 5—or 20 per cent., and the result was an acid several times stronger than would have been formed in the clear saliva; but if I added ½ gram of bread to 5 cc. of the clear solution of the same salivas, there would be formed nearly twice as much acid as resulted from the great excess of mucin. From this we may infer that the solids of the saliva, mucin, glycogen, and other substances, have carbohydrate food to furnish a certain amount of acid, and if continually replenished might be sufficient to carry on the process of caries, but as compared with the ingested foods which remain in the mouth for some considerable time, the salivary solids are inferior in their ability to produce acids.

TABLE II.—MUCIN AND BREAD FERMENTATION.

	CASE 1.	CASE 2.	CASE 3.	CASE 4.	CASE 5.	CASE 6.
Saliva, 5 cc. .... Mucin, 1 cc.	Ac. 1.80	Ac. 1.45	Ac. 1.60	Ac. 1.10	Ac. 1.25	Ac. 1.55
Saliva, 5 cc. .... Bread, ½ gm.	" 2.38	" 2.50	" 2.20	" 1.75	" 2.20	" 3.20

Comparison of fermentation in same salivas between high mucin and solid salivary constituents and small percentages of bread; readings given as equivalent of NaOH x 100 per cc.

INFLUENCE OF PLAQUES.

As we have seen, in the mouths of every individual, whether susceptible or immune, there are the bacteria of caries, and seemingly food enough for their operation, but in one case we have caries of the teeth and in the other we do not. We are all of us perfectly familiar with cases which present mouths that are filthy, in which the fermentations are high, and yet no caries is to be seen. For information as to this class of cases we must look to our third classification of factors, and here we find that our knowledge is very meager indeed. It is commonly agreed that if caries is to be operative the specific bacteria concerned must be protected from dislodgment, and the acids formed must be confined against the tooth, rather than diluted and dissipated by the saliva. We know very little about the means by which the bacteria are protected and their products concentrated. We do know that, under certain circumstances, some sort of a colloidal substance does act as a protective coating for them, and we have called it by the name of "plaque." The substances of which it is composed have been described as "gelatinous," "gelatin-like," "agglutinous," "mucinous," etc., some believing them to be the products of bacteria, and others regarding them as the products of ingested food. Dr. Kirk suggests that they may be mucin which has been deposited over the bacteria by a simple precipitation from the saliva by the acids of the bacteria. I think we all agree with the statement that these plaques or coverings, call them what we will, are not the same material in all cases. Their component substance may differ, in different individuals, depending upon the nature of the saliva, the character of the foods, and the rate of fermentation. And as the character of their composition may vary, their function may also be changed. If we examine any considerable number of sections of teeth which have been prepared in such a manner as to preserve the plaques, we will see that many teeth have well-defined coverings, but that beneath them there is no indication of decalcification. In these cases it might suggest that the plaques, instead of favoring caries, were a protection to the tooth. Is it not possible that in susceptible individuals there is formed a thin, bland film that acts as a dialyzing membrane to pass soluble foods in to the bacteria, and allows the escape of their waste products, while in the case of immunes, even though the hygiene be poor and plenty of carbohydrates be present, yet the nature of the protecting mass is such as to prevent the growth of the organisms, or to exclude from them the carbohydrate food?

SUMMARY.

We have seen that the study of dental caries involves many factors and conditions, and that fertile fields for investigation still remain. These will be worked by men who are interested in the problem, and further information will be added from time to time to that which has already been acquired. But it seems worth while to stop occasionally and, in the light of what is known to date, consider how best we may combat caries in the mouths of our patients today. As I have tried to point out, the evidence at hand seems to indicate that the two greatest controlling factors in the process of caries are the food supply and the plaques. Granting that this premise is true, we then must reduce, as far as possible, the foods, both ingested and secreted, and must prevent or disturb plaque formation. The time may come when we can intelligently bring about these results through dietetic and metabolic means, but until we know more of the principles involved we are forced to fall back upon our ability to locally produce and maintain a condition of oral hygiene in which the teeth will retain a minimum amount of ingested foods, and all fermentation centers will be broken up.

METHODS OF PREVENTION.

We have in times past made the statement to our patients that "Clean teeth will not decay." And this is perfectly

true, but the only way that we can have an absolutely clean tooth is to remove it from the mouth and keep it in a clean place. Cleanliness of the teeth in the mouth is but a relative term, and even though a tooth be polished ever so thoroughly, it is immediately covered and bathed in an infective and acid-producing fluid which may begin at once the early stage of caries. Especially is this true in some mouths, where we see that the greatest care by the patient and operator is not able to prevent the occurrence of caries.

Although oral hygiene is not an absolute panacea for caries, yet there is no doubt that oral hygiene in its true sense is the greatest combating power against the disease which we have at our command at this time. Though it may not produce immunity in all cases, it invariably inhibits the rapidity of caries, and frequently, without any other apparent aid, will entirely prevent it for a number of years. By thorough and effective oral hygiene, the amount of ingested foods remaining in the mouth is decreased to a minimum, the bacteria are periodically disturbed, and their acids diluted and washed away. And indeed in a very large percentage of individuals this factor alone is able to produce immunity. Oral hygiene is, then, a great and efficient factor, and because of its importance it should be given very careful study and attention by every practitioner of dentistry.

When we speak of oral hygiene we immediately think of prophylaxis, but it is my opinion that, in the average individual, mechanical cleansing is but a feature of the preservation of hygiene in the mouth. Not that I would decry or belittle the value and effectiveness of the prophylactic measures which are now in vogue, for I believe that every patient should be thoroughly drilled in the proper use of the brush and floss silk, and should be enthused to the point where he will be faithful in his mouth toilet. But the point I wish to make is that, in the average individual, prophylaxis of the teeth by the patient is but a periodic and spasmodic process, while there is another factor which is continually in operation, and which if normal is the most potent means of establishing oral hygiene. I refer to the self-cleansing of the mouth.

We have all seen cases in which the mouth was relatively clean and free from deposits of foods, when to our knowledge and by the confession of the patient, the prophylaxis had been very negligently administered. In such mouths the food is finely divided during mastication, and as no favorable points for lodgment are offered, it is washed through the oral cavity and into the digestive tract. In addition to this, every surface of each tooth is scoured and cleansed by the excursions of food over them. This is a fact that is so well known that it is almost trite for me to cite it at this time, but I feel that too few of us are using our knowledge to the extent which we might and should. Too many of us are leaving retention places, improper tooth-forms, and flat fillings which are inimical to oral hygiene. How many of us spend time with every patient to see that the filling restores the tooth to its full original form and gives normal occlusion? How many of us search out every retention spot and make it self-cleansing even at the sacrifice of tooth structure or previously inserted filling? Unless we do make this a conscientious practice our instruction in prophylaxis will be of little avail. A mouth that is not self-cleansing cannot be kept clean with a tooth-brush.

Perhaps of all cases it is the approximal cavity that is most sinned against. We have but to look into the mouths of our patients to see that someone—always the "other fellow"—has neglected to get sufficient separation to restore the approximal space at the gingival. There was then no room to produce a normal contact which would allow the food to traverse the mesial and distal surfaces of the adjacent teeth and cleanse them. And then we see that when he has inserted his filling he has made the occlusal surface, in the molars and bicuspids, just as flat as possible. He may have spent some considerable time in perfecting a high polish, but his result has

been a surface which is of little use for grinding, and can only crush the food or hold it while the cusp of the opposing tooth punches holes in it. The operator has forgotten that all-important little marginal ridge which the Great Creator has put on the mesial and distal borders of those teeth to make them effective in mastication. He has thus taken from the tooth a large part of its efficiency, and also has robbed the interproximal space of its greatest protection. So we are prone—yes, I said *we,* for most of us must admit the accusation—we are prone to restore lost tooth substance in a manner that pleases our particular fancy of operative technique, but which has not always a too high regard for tooth restoration, and thereby we are thwarting the greatest inherent protective powers which nature has against caries.

So granting that oral hygiene is so great a factor in the control of dental caries, let us practice it to the best of our knowledge and ability. Let us make every effort to render the mouths of our patients as effective and self-cleansing as possible, and then teach them how to use their dental organs and keep them clean. So may we walk in the light that we have, and look forward to the time when further light will be had that will clear up the dark corners that are now unknown to us!

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

THE VITAL ASPECT OF THE AMALGAM ALLOY QUESTION, AND SOME PRACTICAL SUGGESTIONS.

By WM. W. ATKINSON, Philadelphia, Pa.

(Read before the Academy of Stomatology of Philadelphia, at its annual meeting, Tuesday, December 16, 1913.)

FROM observations covering a long period, the conviction is forced upon the writer that the operation of filling a tooth with amalgam has been and is now too often regarded as a mechanical procedure, with little consideration of its vital aspect; that amalgam is looked upon as an easily worked substance, to be quickly mixed and inserted in a tooth cavity, whereupon the patient is dismissed. Low cost seems to militate against its careful manipulation, and the consequent failures are unjustly charged against the material itself. Its correct use will result from a consideration of the dental operator as a surgeon and physician who, with proper instruments, removes the necrosed portion of a vital organ, and follows this excision with a satisfactory replacement, using for the purpose a material upon which his information is complete. An amalgam filling is, therefore, not a mere "plug" to stop a tooth cavity, but it is a surgical replacement and prophylactic agent of great value, the use of which requires knowledge and skill. It is the purpose of this paper to cover some of the salient points of this phase of the question, and to offer suggestions which it is hoped shall be of service.

WHAT IS AN AMALGAM?

In the common usage of the word, amalgam is a mixture of the metal mercury with another metal or an alloy of other metals. Scientifically, an amalgam is an alloy that is a complete combination with or solution in mercury, of a

metal or an alloy of other metals. In dental usage, however, amalgam is an incomplete solution or in part a chemical mixture of mercury with an alloy of other metals, plus an unappropriated surplus of the alloy base, the alloy having been comminuted in order to facilitate amalgamation. These distinctions as to definition are needed in order that we shall have a clear conception of our material, for an actual alloy or amalgam is a complete combination or solution of metals within each other. Such a material is unsuited for dental use by reason of the large amount of mercury required in its formation. It would be too soft to resist mastication and would exhibit the undesirable property of spheroiding, as well as other changes of form. Conceding, then, the importance of amalgam as a prophylactic agent, and realizing the necessity of knowing our material and of exercising care in its selection and manipulation, let us take up the alloy itself and follow its manipulation step by step to the completion of a filling.

SELECTION OF AN AMALGAM ALLOY.

The most useful amalgam alloys that have been offered to the dental profession are those which contain only the metals silver, tin, and copper, such as Lawrence's, Flagg's "Submarine," several genuine G. V. Black alloys, and the more recent discovery, Ag_2SnCu, in which alloy the metals are chemically combined in the ratio of their atomic weights. It will be noticed that I have used the word "genuine" in connection with G. V. Black alloys, for the reason that there are some alloys on the market which, although they are tested by the G. V. Black method, are not in accord with Dr. Black's published opinions, for they contain zinc, a metal condemned by Dr. Black as a mischief-maker, as alloys containing it are subject to continuous volume changes, being in a state of constant internal motion which causes them to alternately shrink and expand. As zinc is usually placed in alloys as a fourth or fifth constituent, it should be obvious that in such compounds the reactions are more complex, for there is a redundancy of metals which makes for a heterogeneous alloy. Zinc, in a dental amalgam, is positive to all the other metals contained therein, and with copper, especially, forms an ideal galvanic pair, with the warm oral fluids acting as an electrolyte—the result of which may be easily foreseen. Under these galvanic and thermal influences, zinc diffuses and dissolves, and Dr. Black is without doubt correct in his condemnation of it as a constituent of dental amalgam alloy.

It is a mistake to select an alloy because it is easy to mix, and has a velvety working quality. All alloys that are trustworthy are somewhat difficult to mix, and require trituration in a mortar to secure quick amalgamation. Ease of manipulation is a minor consideration, and an easy-working alloy is an unscientific preparation—a commercial product so prepared that it may please the unthinking.

The reason that silver, tin, and copper are to be considered as the only trustworthy metals in an alloy is that other metals, such as gold, platinum, zinc, cadmium, antimony, bismuth, etc., have failed to contribute tooth-saving properties to amalgam alloys, and their use has resulted in various undesirable properties, such as shrinkage, excessive expansion, and structural weakness. On the other hand, the silver-tin-copper alloys, when properly made, are dependable, for they show no marked aberrations and perform the most important function of any filling material, viz, that of saving teeth.

Therefore we shall select a silver-tin-copper alloy of scientific formula and preparation, upon the label of which we shall find information as to the time of manufacture and the method by which it was aged, for an over-aged alloy is weak, and an under-aged or freshly cut alloy is subject to volume changes. It should be demanded that the formula of any dental amalgam alloy appear upon its label. We shall shun the alloy that is sold in the form of large shavings, as only soft alloys can be so prepared. The material should have been

carefully screened in order that no coarse particles are present to cause the amalgam to be of uneven texture.

SELECTION OF THE MERCURY.

The function of the mercury is first to dissolve and then to combine, chemically or otherwise, with the constituents of an amalgam alloy. Impurities present in the mercury are sure to interfere with this process of solution and crystallization, and it can readily be seen that the quality of the mercury used by the dentist is quite as important as that of the alloy. It would seem useless for the manufacturer to strive for alloys approximating a fineness of 100 per cent., if the dentist shall introduce disturbing constituents, and thus adversely affect the result. I am informed that the present method of obtaining mercury that is almost 100 per cent. pure consists in distillation and continued redistillation, under properly observed precautions, until the greasy appearance characteristic of the mercury of commerce has entirely disappeared, and the surface of the metal is clear and mirror-like, with no trace of film, and its globules, when rolled across a sheet of uncalendered paper, do not leave a trail. Mercury undergoes chemical changes if exposed to an atmosphere that contains coal, illuminating or sewer gases, as these gases give up their sulfur to form sulfids with the mercury, and, it may be added, sulfur is the arch-enemy of amalgam fillings. Sulfur is present in the hard-rubber containers very often used, so that for office use a container of boxwood is best.

THE PREPARATION OF THE CAVITY.

We shall pass over that part of the preparatory work that consists of the removal of carious tooth structure and in putting the tooth into healthy condition for the reception of the filling, and take up the shaping of the cavity. In preparing the cavity, we must have in mind the physical properties of amalgam. All amalgams are brittle, following the rule that most alloys are more brittle than any of their constituents. Therefore there should be no beveled edges of the cavity walls, which should terminate as nearly as possible in right angles, for otherwise the edges of the filling are likely to break under the burnishing or the subsequent stress of mastication. There should be retaining pits drilled into the walls and floor of the cavity. If these pits are at opposite angles, they securely lock the filling. Such pits are important in all cavity preparations where amalgam is to be used. Thin walls should be cut away, as a first-class amalgam expands slightly in setting, and this expansion is often pronounced enough to break down frail cavity walls. In order that the property of expansion may be utilized, the cavity should have a slight inward slope from the outer edges to the floor; the expanding mass thus forcing against the walls meets increasing resistance in its outward progress, and so seals itself within the cavity. The degree of expansion can, in a measure, be controlled by regulating the amount of force with which a filling is placed. Expansion is an expression of the release not only of the mechanical strain of the condensation of compression, but also of the release of the strain of the condensation caused by the sudden chilling of the alloy when cast into a relatively cold ingot mold. It is a readjustment of the crystallizing alloy to a state of physical equilibrium, this action being materially aided by the heat of the mouth. A most important fact in this connection has come to my observation, viz, that the expansion of a filling made from an annealed ingot is markedly less than that of a filling made from an ingot that has not been annealed.

THE USE OF POSTS AND MATRICES.

If posts and matrices are to be used, they are placed in position, and the cavity is dried and protected from moisture, in readiness for the reception of the filling. It is often necessary to anchor a filling by inserting posts in the root-canals of a tooth. Platinum is the best metal for this purpose, because, the affinity of this metal for mercury being

feeble, disintegration caused by diffusion does not occur so rapidly as when other metals are used. It should be emphasized that, whenever any large portion of the walls of a tooth is missing, a matrix must be used to support the filling until the completion of the process of crystallization, to serve as a mold in which the filling is made to conform to the original contour of the tooth, and, most important of all, to provide a resistant wall which, in connection with the cavity walls, shall surround the filling. This controls the direction of the expansion of the filling, which should take place over as small an area as possible, and at right angles to the floor of the cavity. The matrix should be fitted in almost the same manner as the collar for a gold crown. It should be closely adapted at the cervical margins, and should be almost high enough to meet the occluding teeth, but that part of the matrix which does not inclose the cavity should be cut down to a convenient width. Its function is that of a yoke, the ends of which we join with solder, and which we then place in position on the tooth. For an approximal filling, the matrix should, when possible, be tightly wedged by means of a V-shaped piece of orange-wood forced between it and the adjoining tooth. This prevents the amalgam from being forced out at the cervical margin, where its removal is difficult after the amalgam has set. German silver or an alloy of nickel and copper can be used for the matrix. This should be annealed until heavily coated with oxids, then hammered or burnished; the matrix is thus prevented from adhering to the filling. The thickness of the matrix depends upon the strain that it must meet, but Nos. 30, 31, or 32 (Brown & Sharpe gage) afford sufficient range.

MIXING AN AMALGAM.

The amount of mercury required for proper amalgamation depends upon several factors, *i.e.* the "age" of the alloy, its percentage of silver copper, and the size of the filings. A trifle less than the weight of the silver-copper content of ordinary alloys is the necessary amount of mercury, or between 65 and 70 per cent. of the total weight of the alloy used. A greater quantity of mercury, in fact from 80 to 100 per cent. of the weight of the filings is demanded when mixing Ag_2SnCu or the G. V. Black alloys. Under-aged, freshly cut, or finely powdered alloys require a greater percentage of mercury, and are, for these reasons, quicker setting—that is, they more quickly attain their final stage of crystallization and maximum of strength. Weighing, which from the foregoing statement might seem necessary, is not viewed with favor by the majority of dentists, for the reason that weighing such an elusive substance as mercury is uncertain and aggravating. As this is not of paramount importance, we shall meet the situation by introducing an excess of mercury, thus securing quicker amalgamation. This we shall wring out between the folds of closely woven muslin or chamois-skin. Those alloys which oxidize heavily when they are amalgamated are improved both in appearance and strength by washing with absolute alcohol. Denatured alcohol should not be used, as it contains water, and sometimes oils such as gasoline, which obviously would interfere with the strength of a filling. Washed fillings should be carefully dried between the folds of a linen or absorbent napkin.

The mixing and subsequent manipulation of the amalgam should not be done in the hand, for this is by no means a "dainty" method, and is, moreover, injurious to the dentist. In connection with this, we quote the following paragraph from a brief treatise on "Amalgam Fillings" by Dr. R. H. Riethmüller, DENTAL COSMOS, March 1912: "The manipulation of amalgam in the palm of the hand is not only unsanitary, as it entails introduction of perspiration, bacteria, and epidermal cells into the mixture, but also interferes with the perfect working quality of the amalgam."

In the DENTAL COSMOS for June, 1913, a review was published of a paper on mercurial infection by Dr. Arvid Blomquist, Stockholm, in which attention is called to the dentist's exposure to this danger through absorption of the

mercury from mixing amalgams in the hand. This is worthy of serious thought, for aside from the unclean and dangerous features, substances are introduced which mechanically reduce the strength of an amalgam, also fatty acids which assist in its chemical destruction. In mixing our amalgam, then, we shall use mortar and pestle, either of wedgwood or ground glass, of sufficiently large size to insure rapid work. We triturate the amalgam until the desired plasticity is attained, which should require not more than a couple of minutes. Amalgam should not be worked too long, nor until it is reduced to a very fine paste; in fact, the alloy which at this stage exhibits a granular appearance is the most dependable. Crystallization is rapid in its first stages, and continued mechanical disturbances interfere with this process and reduce the force of crystalline attraction by shifting the crystals across their planes of contact, the result of which is structural weakness.

INSERTING THE FILLING.

We rapidly fill the retaining pits, vigorously burnish the amalgam over the floor of the cavity, and build outward from the floor by compressing small pieces of amalgam with broad pluggers which have wide serrations. As the filling progresses, we burnish its edges to the cavity walls in the same manner as we coated the cavity floor, until the cavity is filled. Some operators, during the course of packing a filling, use gold or tin foil to absorb the excess of any mercury which rises to the surface as the filling is condensed. For this purpose a pencil-like rod of pure tin can be easily handled, and can be made by rolling heavy tin foil around a smooth wire. Great care should be exercised in the use of either metal, so that no small portions adhere to the filling and thereby upset its physical balance and cause it to be weak. A filling treated in this way is quicker setting, and gains its maximum of strength more rapidly. With appropriate instruments we then contour the filling, and where there is occlusion we provide for correct articulation, avoiding too close contact with the opposing teeth. The filling should not be polished until it has set, that is, for forty-eight hours, and if a matrix has been used, it should be left in position for that length of time, otherwise the edges of the filling are apt to chip off. We shall use fine carborundum stones for roughing off, following this with strips and disks, then pumice and whiting applied with rubber cups in the engine. The final finishing consists in a light burnishing for the purpose of condensing the surface of the metal. This last operation increases the resistance to chemical solution in the mouth, for a condensed, highly burnished metal better resists even the action of strong acids than does one of looser organization.

Should it be necessary at any time to remove an amalgam filling, we shall prepare a mixture of two parts by weight of cosmoline and one of paraffin by melting them together; this we smear over the filling as a lubricant in burring, which will prevent the clogging and dulling of the bur, greatly hasten our work, and do away with the heat of friction so irritating to the patient.

[See also *Discussion,* as reported under "Proceedings of Societies," this issue.]

THE PREVENTION OF PYORRHEA AND DENTAL CARIES BY ORAL PROPHYLAXIS.

By F. H. SKINNER, D.D.S., Chicago, Ill.

(Read before the Southern Branch of the National Dental Association, at its annual meeting at Old Point Comfort, Va., July 22, 1913.)

THE development of pyorrhea is dependent upon two conditions; first, local irritation and susceptibility to infection, second, a lowering of general vital resistance.

The following are some of the conditions which may be classified as local irritation and infection: Soft accumulations allowed to gather and remain at or near the line of attachment of the soft tissues; poor contact points, resulting either from fillings, crowns, improper alinement, or from wearing away of the tooth structure; ill-fitting bands, or bands which have been driven up until they impinge upon the pericemental membrane; improperly shaped crowns which do not protect the soft tissues in the mastication of food; improperly shaped tooth-brushes, or improper use of a brush; fillings not properly finished at the gingival margin, or fillings which will not retain a hard, smooth surface where the gum tissues lie against them, as oxyphosphates and most of the silicate cements; snapping, jamming, or cutting of the septal gum tissue with dental floss or toothpicks, and last but not least, malocclusion.

Some conditions which produce lowered vitality are lack of sufficient use of the teeth in mastication, and systemic diseases, prominent among which are diabetes, intestinal toxemia, faulty metabolism, and anemia.

TREATMENT.

All deposits, both soft and hard, are removed from all surfaces of the teeth not covered by gum tissue and from under the free margins of the gums, but no attempt should be made to go into deep pyorrhea pockets at this time. Then a thorough polishing is given, as in prophylaxis treatment. If enamel surfaces are etched or rough, either from lack of proper development or from early neglect, they must be planed or filed smooth and polished. I then use the Dunlop spray and dismiss the patient for a day or two, when the gum tissues will be found less sensitive, and the inflammation greatly reduced. For the next two or four weeks I give a Dunlop vapor treatment every three or four days, and a prophylaxis treatment whenever the disclosing solution indicates it to be necessary. This vapor has an affinity for diseased tissue, and it is surprising to see how it will penetrate both soft and bony tissue. I have introduced it at a canine and seen it come bubbling out from the inner wall of the gingiva of the third molar, or even crossing the median line and coming out from the canine or bicuspid on the opposite side, apparently traveling through bony tissue from which, because of infection and inflammation, sufficient calcium salts have been dissolved to leave it a porous, spongy, diseased mass. Red or cyanotic areas located well up on the gum tissues indicate osteitis or osteomyelitis, and can always be reached, and good circulation can be established there by the proper use of the Dunlop vapor.

Nearly every case of pyorrhea exhibits malocclusion; cusps, crowns, bridges, or fillings which bring undue stress to bear on any root or prevent free lateral movement of the jaws in any direction should

be ground so as to bring about a perfect correction of the abnormal condition. Plaster models often help in correcting malocclusion. Contact points which allow food to crowd on to the septal tissue should be corrected. Some form of partial plate or removable bridge should be made so as to have the resistance to the opposing teeth depend upon equalization of pressure between abutments and saddles resting upon gum tissue. All saddles should be at least three-eighths of an inch from any teeth, for if closer than that they act as a constant irritant and also impair circulation to the surrounding tissue, and will ultimately result in the loss of the tooth. Any teeth which cannot be made healthy should be extracted at once, for they only keep up irritation and infection in the tissues which we are trying to restore to a healthy condition.

The inner portion of the alveolar process is rather a porous, spongy bone, perforated with many channels, known as Haversian canals, through which a rich supply of blood is furnished to the parts. The lingual and labial plates, as well as the parts which form the alveolus—socket of the tooth—are more dense. Mr. Arthur Hopewell-Smith* of London has termed this hard layer, next to the tooth, which forms the walls of the alveolus, the linea dura. This can be detected very plainly in an X-ray picture. When this linea dura is once entirely destroyed, a tooth cannot be saved.

Splinting all loose teeth is very necessary, for we cannot expect healthy granulations to form when loose teeth are constantly moving around and breaking them up. Sometimes it is necessary to use permanent splints, as bridges, or bands, which may be worn a year or two and then removed, at other times wiring or tying with silk or grass-line ligatures will do.

I prefer to keep pulps vital, for in my opinion a more healthy condition and better attachment of the tissues is obtained. Anyone who has done pyorrhea work recognizes the difference in the sense of feeling when working on the root of a vital, healthy tooth as compared to the spongy feeling of teeth which have been devitalized. If we have to devitalize teeth for bridges or crowns, let us do it, after we have established normal conditions. When possible, I use outside attachments for bridge work, such as inlays or Carmichael attachments, and I do not hesitate to crown a tooth with a vital pulp, providing I can cut the tooth down so as to adapt a well-fitting band—but do not run the band higher than the tooth is prepared for it. Bands can be fitted as accurately as inlays, and prophylaxis will prevent decay at the gingival third.

Of course, the operator must use judgment in selecting his patients for this class of work, preferring those who will keep up oral prophylaxis as described later in this paper.

After a few weeks, under prophylaxis and the Dunlop vapor treatment, some of the pockets, and in a very few cases all of them, will have healed entirely, but usually it is necessary to do instrumentation on some of the roots. Under the Dunlop vapor treatment, larger deposits disappear sometimes, or flake off under very little pressure. I expect the gums to reattach without recession in these places, so I am careful not to injure the pericemental membrane. Where this result is not obtained, thorough instrumentation is necessary.

INSTRUMENTATION.

A great many operators fail on account of selection of improperly designed instruments.

The cementum, or outer covering of the root, presents a rough, irregular, pitted surface to which the pericemental membrane and dental ligaments and fibers gain a very firm attachment. Next under the cementum is a thin, dense layer, and under this are large open spaces known as lacunæ, which are filled with the same substance as the dentinal tubuli. If we cut through the hard layer underlying the cementum and open the

(* See "Some Studies of the Jaws in Health and Disease," by A. Hopewell-Smith, DENTAL COSMOS, August 1913, p. 765.)

lacunæ, we expose a surface where pus-producing bacteria will propagate by millions, and infection and inflammation are sure to follow. In addition to this, an extremely sensitive surface will be exposed, and caries most likely will set in later on.

INSTRUMENTS.

There are a great many so-called pyorrhea instruments on the market without which members of the profession, as well as their patients, would be a great deal better off. I refer to chisels, gouges, scrapers, etc., with which it is impossible to produce a smooth surface, and which do not limit the depth to which they cut. There are only two styles of instruments with which the essayist has ever been successful when thorough instrumentation was necessary. The older of these is the well-known Younger set, which is really a fine, delicate set of scrapers. If the operator keeps these scrapers sharp and has a delicate sense of touch, he knows when he has removed all deposits, dead pericemental membrane, and the rough and pitted surface of cementum, and he stops as soon as he has reached the hard layer; but these instruments, even in skilled hands, cause more or less pain, so that most operators have to use hypodermic injections of cocain. Then, too, they leave a slightly burrowed surface, and the sharp ends of the instruments frequently lacerate the tissue, so that, following the operation, usually there is soreness which lasts from a few days to a few weeks. The other instruments are known as the Carr scalers.

Several years ago, Dr. Gartrell of Washington, D. C., introduced a blade similar to a Japanese plane, but did not develop a usable set of instruments. Dr. C. M. Carr perfected a set of instruments with which the operator, after learning how to handle them, can reach and plane any and all surfaces of the roots of any tooth, whether it be convex, flat, or concave, except sharp angles where roots bifurcate, in which case an instrument of the Younger type is preferred. When properly sharpened, the blades of these planing instruments cannot be made to cut deeply, but they plane a very thin shaving with each stroke. Almost any operator who has learned to handle them can tell by the sense of touch when he has reached the proper surface. They cause so little pain that it is seldom necessary to use any anesthetic, and all soreness usually leaves within twenty-four hours. I think an operator can do more accurate, delicate work and cause his patient less pain with these planing instruments than with any other form of pyorrhea instruments made.

After the cementum has once been planed to the hard surface, sharp cutting instruments should never be used on it again, for fear of opening the lacunæ. Should the patient be negligent in home care or about keeping appointments for prophylaxis, or be unable to present himself at the dental office regularly, and should deposits start again, there are no better instruments to use than the style known as the Smith trimmers. These soon lose their edge, thereby eliminating the danger of cutting too deeply, yet are sufficiently sharp to remove deposits from the hard surface. The Smith set is good, but a little awkward for reaching obscure places. Dr. R. O. Hutchinson of New York, Dr. T. B. Hartzell of Minneapolis, Dr. J. L. Kelly and Drs. Buckley and Logan of Chicago, Dr. H. H. Tompkins of Utica, N. Y., and, I presume, many others, have added several shanks of different angles to the regular set of these little trimmers or files, making the operation much easier for both patient and operator.

Once all deposits and other rough and irritating substances are removed and the rough tooth surfaces have been planed smooth, daily vigorous rubbing with cotton rolls as suggested by Dr. J. L. Kelly of Chicago, is a great aid in stimulating circulation. The cotton rolls will remove débris from the teeth, cheeks, gums, and roof of the mouth more thoroughly than a tooth-brush will, and it is impossible to injure the teeth or gums with them, as is frequently done by improper handling of a tooth-brush.

About 75 per cent. of the cases of pyorrhea can be cured by thorough in-

strumentation, and the Dunlop vapor will add 20 per cent. more. I believe that, when the Dunlop vapor has been used, the results are better, viz, the attachment of tissue will take place nearer to the neck of the tooth, and less instrumentation will be required for obtaining results.

The other 5 per cent. of cases which do not readily respond to these treatments are complicated with some systemic condition, and that condition must be diagnosed and relieved. Constipation, faulty metabolism, and intestinal toxemia frequently keep up an inflamed condition of the alveolar process and gum tissues. Often, in cases of this kind, the oral condition will respond immediately upon putting the digestive tract in order, but more often, intestinal disturbances disappear upon putting the oral cavity in order.

Dr. Dunlop claims that his vapor treatment has produced beneficial results whenever he has used it in cases of diabetes, and the results obtained in two cases that I have treated during the past year seem to corroborate his claim. Should others obtain these same results, it would indicate a very close relationship between a diseased alveolar process and the run-down condition which results in diabetes.

VACCINES.

Vaccines have proved very valuable in some cases, but it is necessary to determine just what the infecting organism is, in order to obtain results with this treatment. The aerobic forms are easy to determine, but anaerobic bacteria are rather difficult to diagnose and are very difficult to produce cultures from. Strictly anaerobic bacteria are quickly killed or driven from the alveolar process and surrounding tissues by the Dunlop vapor, because they cannot exist in the oxygen which we are able to introduce into the tissues by means of this treatment.

There is one other form of chronic suppuration which is very trying to deal with, in which the gum hugs the neck of the tooth so closely that pus burrows upward or laterally into the process. These cases sometimes respond to vaccine and vapor treatment, but usually it is necessary to open the gum over the cyst—which has been located by an X ray—to curet all necrotic or carious bone, plane the roots to the hard surface, and pack the cavity with gauze and euroform paste for twenty-four hours; then the cavity is charged with Dunlop pocket-packer or Bismuth paste, until filled with granulating tissue. The operator must always be on his guard when a deep pocket, through which a probe can be passed to or near the apex of the root, develops at the side of one tooth, while the rest of the mouth is healthy. Four times out of five this pocket represents an apical abscess resulting from a dead pulp, and not pyorrhea.

Patients always should be told that, as a rule, pyorrhea is the result of neglect; that they will have to work harder than ever before to maintain a healthy condition after they have been cured, and that it is only with their co-operation in massaging the gums and with periodical prophylaxis and constant mouth hygiene that a permanent cure can be maintained, because the same cause will produce the same effect again.

SOME THOUGHTS ON ORAL PROPHYLAXIS PRACTICED AS A SPECIALTY.

Until a more appropriate term has been found, the writer chooses to interpret "oral prophylaxis" as covering any branch of operative dentistry which will meet the ideal requirements from an esthetic point of view and tend to keep his patients' mouths in a hygienic condition, whether it be the insertion of a filling, inlay, or root-filling, the making of a crown, the construction of a bridge, or finishing the "other fellow's" work down at the gingival margin.

Looking at oral prophylaxis from this point of view, it does not seem possible that the man who sets himself up as a specialist in pyorrhea and prophylaxis, and confines his work to the use of pyorrhea instruments and polishing teeth, is doing the best work in his community, when men not associated with him are

depended upon to do the prosthetic work. Nor do I believe that he will be a permanent fixture in the dental profession, for no matter how skilfully the specialist performs his work, it will be a failure in mouths which need repair work, unless the man who does the repair work understands the causes which bring about diseased conditions of the mouth, because bands will be used where they are not indicated, and some of them not fitted overly well at that. Work lacking proper contour to protect the soft tissues will be inserted; fillings, inlays, crowns, and bridges will be constructed which do not occlude properly nor furnish support to the abutments, thereby causing lateral stress on the process, followed by soreness, inflammation, infection, and loss of the organs; bridges which cannot be kept clean will be worn and great masses of food will lodge under them and ferment, thus making a breeding-place where millions of pathogenic germs will be incubated, some of which will be mixed with each morsel of food that is swallowed, besides occasionally infecting the surrounding tissues, and the loss of the teeth is sure to follow work done by men who do not follow out the principles necessary for maintaining hygienic conditions. If teeth are lost after a specialist has once worked on them, it will be the fault of the specialist, from the viewpoint of the patient and the general practitioner; therefore, from this point of view, every dentist should be a practitioner of oral prophylaxis, if not a pyorrhea specialist. The plan suggested by Dr. Robin Adair of Atlanta, Ga., in his paper entitled "The Introduction of Oral Prophylaxis into a Dental Practice," published in the *Dental Summary* for December 1911, should be an inspiration to every dental practitioner. Therefore these suggestions are intended for the man who is carrying on a general dental practice, because anyone who has ever treated pyorrhea successfully realizes the necessity of having his work followed up with such prosthetic work as will maintain healthy conditions.

In fact, if more dentists practiced oral prophylaxis, there would not be as much need for repair work, pyorrhea specialists, or medical men, for the mouth is the intake of the body, and 80 per cent. of all infection enters by this portal, and if it is kept in a clean, healthy condition, the vital resistance is much higher. It is now commonly believed that a great many systemic ailments are contracted through the mouth tissues when these are in a pathological condition.

When pyorrhea pockets and abscesses with sinuses are present, pus is discharged into the mouth, and every morsel of food and every drop of saliva which is swallowed carries quantities of infectious matter into the stomach. This prevents the stomach from properly preparing the food for the intestinal tract, and before it is eliminated from the body poisonous ferments will form and be absorbed. Many systems will tolerate this kind of treatment for years, but sooner or later the effects will become apparent. Infectious matter from blind abscesses, lateral abscesses, and congested areas in the alveolar process is absorbed directly into the circulation, causing various pathological conditions, and is taken up by the lymphatics, and if the lymphatic glands cannot get rid of the infection rapidly enough, enlarged or suppurating glands will be the result. Last, but not least, when masses of decaying matter are allowed to remain around the teeth, infection enters the tissues through the little ducts or glands ("glands of Serres," described in "Interstitial Gingivitis," by E. S. Talbot) which line the inner wall of the gingiva, and is taken up and distributed through the system by the circulation; or osteitis, osteomyelitis, or lateral abscesses and pyorrhea are caused.

Some of the diseases for which mouth infection is held partially responsible are glossitis, diseased tonsils, deafness —through infection of the Eustachian tubes—catarrh and catarrh of the stomach, bronchitis, colds, tonsillitis, stomatitis, diarrhea and constipation, dyspepsia and indigestion, infective endocarditis, enlarged glands, iritis, gout, headache, general infection, septic infection of joints, nephritis, pneumonia, ulcer of the stomach, rheumatic conditions, pernicious anemia with all of its

after-effects, tuberculous glands, and tuberculosis. Furthermore, cavities in teeth always contain the tubercle bacilli, which endanger not only the individual harboring them, but also anyone who is near him whenever he expectorates, coughs, or sneezes.

IDEAL PROPHYLAXIS.

Ideal prophylaxis should be started by the prospective mother's mouth being put and kept in first-class condition, so that her mental and physical well-being will be at or above par. Foods containing calcium salts, phosphates and carbonate of lime, are supposed to help make bone, hence should also have a tendency to start a child in the right direction as far as teeth are concerned. Wholesome living, plenty of rest, and outdoor exercise make a very good program for the prospective mother as well as for the child.

A friend who has done a great deal of research work told me that in every case of atrophied enamel of which he could get a history, the child had been a bottle-fed baby, and my own questionings in cases of this kind have all corroborated his findings. So, for this as well as many other reasons, it is best that the child be fed in the way provided by nature, when possible. As soon as a child begins to take food, its mouth should be wiped out several times daily with cotton or a small piece of cloth held in a suitable carrier or wrapped around the index finger. The membrane of the cheeks and gums and beneath the tongue requires special attention, as here coagulated milk usually is found. If the infant's gums become feverish and swollen while teething, there is nothing better than the ingenious little rubber doll with the long nose filled with ice-water, known as the "Koolbite," invented by Dr. J. Bridges of Chicago. Anything a child likes to play with goes directly to his mouth, and this Koolbite, as its name indicates, does a great deal to reduce the inflamed gums. It is so light that the tiniest hands can hold it in place, yet it is too heavy to stay in the mouth unless held there, so that the disadvantages of a comforter are eliminated.

The mother or nurse should be taught that, as soon as the deciduous teeth begin to erupt, they should be kept clean. She should be taught to watch for and remove all foreign substance which gathers on the child's teeth. If she asks how often they should be cleaned, the answer is, "As soon as foreign matter accumulates on them." She should be told that if she were to mix up the food with her hands as she does with her teeth, she would wash her hands after each instance, and that the same principle applies to the teeth.

The parents should be induced to bring their children to a dentist's office, so that he can make friends of them long before it becomes necessary to do any work for them, and can teach them that, if prophylactic work is done before caries has started, 95 per cent. of this work can be prevented. The dentist by all means should do prophylactic work for children before there are any cavities to be filled. As children grow to be four, five, or six years of age, they like to imitate their parents, so I try to get up a rivalry to see who has the cleaner mouth, the child or the parent.

Between the ages of five and six years, there should be a perceptible spreading of the spaces between the central incisors. Where this is not observed artificial means should be resorted to, in order to develop lateral growth of the anterior portion of the jaws. Wearing a very simple appliance for a month or two at this age will frequently save two or three years of regulating at the age of twelve or fourteen years. Any up-to-date orthodontist will agree that, when the jaws do not show proper growth, a little forced development of the anterior portion at the age of from four and one-half to six years will produce better alinement of the teeth and more esthetic results than can be obtained by waiting until all of the permanent teeth have erupted.

Deep fissures and pits should be protected with cement before caries has set in.

EROSION.

There is undoubtedly such a condition as erosion, but the writer has never seen a case which did not have a history of vigorous cross brushing with a stiff brush and an abrasive powder, at some period of the patient's life. Litmus paper placed in the mixed saliva or on the tongue may show no acid reaction, but when placed just under the gingiva of an eroded tooth, a decided acid reaction will show at that point, indicating that an acid is being excreted. It is my belief that this local condition is produced by some irritant, due either to the improper handling of a brush, to roughened or etched enamel surfaces, or to a very narrow line of foreign substances adhering at the gingival line, which can be made visible only by the use of a disclosing solution.

In these cases, I prevent the patient from using a tooth-brush improperly, or forbid him to use a brush at all, and have him depend upon the cotton rolls and tape for everyday cleaning, and induce him to polish the teeth two or three times a week with an orange-wood stick or a wood point held in a suitable holder.

Of course, I do very careful instrumentation with the planing instruments, so as to remove any local irritation, and I insist on the patient's using the disclosing solution to see that no foreign substances gather and act as an irritant. It is my experience that, after a few weeks, the gingivæ in cases of erosion when treated in this way no longer show an acid reaction to litmus paper, and a very close clinical observation will show no further wasting of tooth structure.

A few individuals can have all kinds of débris on their teeth and the mucous membrane of the gums, cheeks, and tongue, and yet show no tendency to caries or pyorrhea, and until we can account for this phenomenon, we cannot treat these pathological conditions of the oral cavity scientifically.

Miller and Black account for dental caries by the lactic acid theory. Some of our most scientific and thorough investigators claim that they have never been able to find any lactic acid in the mouth, or in the mass under which decay is taking place. Some claim that tooth destruction takes place by oxidation of foreign matter left on the teeth, but they all acknowledge, and clinical observation verifies the claim, that if it were possible to keep the teeth always clean, dental caries and pyorrhea would not exist, so that unless an individual is absolutely immune to dental pathological conditions, the cleaner his mouth and teeth can be kept, the less trouble he will have. Even if he is immune to dental troubles, he will have more self-respect and command more respect from those with whom he comes in contact, if he has a clean mouth than if he allows it to assume and remain in a filthy condition.

Dr. Frank Low claims to have reduced sensitive conditions at the gingival third and to have obtained at least partial immunity to caries by the administration of tablets composed of ½ grain of sodium sulfocyanate and 2 grains of powdered hydrastis. He gives one tablet every day for twenty days, and if the saliva does not lose its ropy consistence, he may repeat the treatment. My own experience with this treatment shows that the saliva becomes much more watery, and I believe fewer plaques gather on the teeth, those which do gather being more easily removed. Dr. H. P. Pickerill, in his "Prevention of Dental Caries and Oral Sepsis," claims that dental caries is decreased by increasing the quantity and alkalinity of the saliva, and that this can be accomplished by the use of acid mouth-washes and a fruit diet or at least by ending a meal with fruit. He gives several formulæ for mouth-washes in which he uses cream of tartar, commonly known as potassium bitartrate; he calls it acid potassium tartrate. It leaves a very clean, pleasant effect in the mouth. He also says there is nothing better than a slice of orange with which to end a meal.

These theories are, undoubtedly, valuable, but I should not like to depend upon them entirely for saving teeth.

So, while it may not seem scientific to our research workers, oral prophylaxis is at present the best means we have of keeping the mouth and the body,

as a whole, in a healthy condition. In order to make a success of this work a dentist must know from experience what clean teeth and a healthy mouth are, for his arguments lack force if he does not practice what he desires his patients to follow.

He must also be able to convince his patients that preventive work is better than repair work; that nature's crowns, when properly formed, are better than the best porcelain crowns he can make, and last, but not least, he must obtain a fee which will pay him to do his work thoroughly. Otherwise, he will become discouraged, and not carry out the technique necessary to obtain results, in which case his patients will say that oral prophylaxis is not a success.

USE OF A DISCLOSING SOLUTION.

Microbic plaques and small granules of calcific deposits are transparent, or so nearly of the color of the teeth that they are frequently invisible to the eye. The sense of touch, after months of experience with a hand polisher or orange-wood stick, will only imperfectly indicate to us whether or not a surface is clean, so that the only means of absolutely proving whether all foreign substance is removed from surfaces not covered by gum tissue is the use of a disclosing solution.

The following formula has proved the most satisfactory of any I have tried:

Iodin crystals,	50 gr.
Potassium iodid,	15 gr.
Zinc iodid,	15 gr.
Glycerin,	4 dr.
Aqua destillata,	4 dr.

Mix. Put up in glass-stoppered bottle.

Sig. Paint two or three teeth at a time. Rinse immediately with water.

Anything to which the stain adheres is foreign substance and should be removed, and such surfaces should be polished. This is an aqueous solution of iodin, which while it is slightly astringent, does not smart or blister the soft tissues, and when painted on the teeth and gums produces little or no sensation. It leaves no stain on a clean, polished surface, but the most minute patch of foreign substance can be detected at once.

Oral prophylaxis is a term used to distinguish the thorough, periodical work of removing that which causes dental pathological conditions from the so-called "cleaning," which generally means polishing the buccal and labial surfaces of the teeth with a rubber disk or brush wheel used in the handpiece of a dental engine.

For proper polishing in a prophylactic treatment, points of two different shapes, held in polishers, are required; first, a broad, flat point for polishing the distal surfaces of the last molars and buccal and lingual surfaces of the other teeth; second, a thin, sharp point for reaching the interproximal surfaces and the vicinity of the contact points. Dental tape is the only means of polishing one of the most vulnerable and inaccessible surfaces, *i.e.* the contact point and its immediate vicinity; then we should stain and polish until the disclosing solution shows all surfaces to be clean. Of course, any substance which is not readily dislodged with the wooden point and a fine abrasive should be removed with scalers, and the surfaces highly polished. Dental floss is a great aid in indicating the presence and exact location of small deposits of serumal calculus on the approximal surfaces just under the free margin of the gums. It is our duty to smooth and polish any etched or roughened surface, for no patient can keep a rough surface clean. Etched surfaces are detected only by careful hand polishing aided by the use of a disclosing solution.

When a patient first presents himself, unless for the relief of pain, he should be shown the accumulation on his teeth by painting the surfaces with the disclosing solution. He should be given a hand mirror so that he can see the operator apply the stain. The revelation is usually very much of a surprise. One patient said she believed the stain exaggerated altogether. When patients are of this opinion, the cleaning of one or two teeth and the using of the disclosing solution again will readily convince them

that it does not exaggerate. The suggestion should be made that if such a fetid, infectious, decaying mass were left on the hand for weeks and even months, the patient would not be surprised if the surrounding flesh became inflamed and began to suppurate, which frequently happens to the tissues adjacent to the teeth. While working, the operator should explain that enamel is composed of from 95 to 98 per cent. of calcium salts, and that just as the rusting of a piece of steel is a chemical reaction of the elements, so decay of teeth is a chemical reaction between the calcium salts of the enamel and the by-products of fermentation; that this causes the withdrawal of the calcium salts, leaving the tooth structure etched or honeycombed. It should also be explained that, just as the rusting of steel can be prevented by polishing, so dental caries can be prevented by hand polishing, and that as all dental caries starts upon the outer surface of a tooth under a fermenting mass, no mouth-wash can penetrate it to stop decay; also that a great deal of harm is done to gums and tooth surfaces by improper brushing with an abrasive.

A patient should be taught how to handle a brush properly. The first brushing, when the brush is the stiffest and carries the first grit of powder, should be done on the masticating surfaces of the posterior teeth, in order to clean the fissures. A backward-and-forward and side-to-side motion should be used; then the brush should be placed well up on the gums, and with a rolling motion brought toward the occlusal surface, *i.e.* up on the lower and down on the upper teeth on both lingual and buccal surfaces.

In order to expose the lingual surfaces of the teeth to the brush, the tongue should be drawn well back. Frequently I give a demonstration to show the patient how to use the brush, and then have him practice before me until he uses it correctly. He should be careful never to prick the gums with the bristles, as they always carry infection. Patients commonly start brushing always in one place, usually at the gingival margins of some of the anterior teeth. This should be watched for and stopped, for the brush is always stiffer when first put into the mouth, and this, in connection with the first grit, if an abrasive is used, and applied in one place year after year, is sure to cause gum recession and to wear through the thin enamel of the gingival third.

I prefer rather small brushes of medium texture. The lingual surfaces of anterior teeth can be brushed best with a small brush, which can be used with a rolling motion, because a brush of ordinary size bridges over the inside of the arch. The lingual surface brushes which are used as a hoe are sure to prick through and thus infect and injure the gum tissues. A brush never should be used more than once in twenty-four hours; therefore enough brushes should be kept on hand to allow each one to dry out before it is used again. The teeth and gums should be brushed after each meal. The chief good a tooth-brush accomplishes is the removal of some of the loose débris and the massaging of the gums, which produces a hardened and healthy condition. But if a brush is not properly handled, it produces damage rather than benefit.

Dental tape or floss should be used for polishing the approximal surfaces at least once a day. When putting this past the contact points, a short, tight hold should be taken of the tape, holding the buccal end a little higher than the lingual, so as to pass the contact points rather sidewise, thus keeping the tape from snapping down on the gums.

This home care, with periodical visits to the dentist, will keep the teeth looking clean, but little rough patches begin to gather within from two to six days after a prophylactic treatment, and are discovered by the tongue. The use of the disclosing solution verifies the discoveries of the tongue. The tooth-brush, although used intelligently, will not keep these fermenting patches from forming, nor entirely remove them. To prevent pyorrhea and dental caries, the teeth must be more than esthetically clean.

My patients rub their teeth, cheeks, and palate and massage their gums with

a roll of cotton held in a suitable holder. I believe they are doing more effective work with this and the dental tape than with the tooth-brush. It cannot injure the teeth or soft tissues, and where it reaches, the cotton seems to remove débris left by the tooth-brush. It also removes all viscous materials, dead cells, and particles of food from the mucous membrane. As far as I know, the idea of this use of a cotton roll was first suggested by Dr. J. L. Kelly, Chicago. According to Dr. Pickerill the presence of these foreign substances tends to reduce the tooth-preserving properties of the saliva.

Patients are provided with a cotton-roll carrier, a supply of cotton rolls, polisher and points, dental floss or tape, a mouth-mirror and iodin disclosing solution or its formula, and the majority of them learn to use these articles very well. Frequent, periodical, professional prophylaxis treatments are the only means of preserving the teeth of patients who do not care to learn how, or who do not have sufficient dexterity to handle a polisher.

The intervals between treatments must be determined by experiment. Some patients will keep their mouths reasonably clean for only fifteen days, others for thirty, sixty, or ninety days, but when the period has been established, they should be notified regularly, for they procrastinate or forget entirely, and regularity of treatments is absolutely necessary.

The only way to tell, definitely, whether or not foreign substance is present, is to use a disclosing solution, and thus we are enabled to polish only where débris is lodged. This is a great advantage, as we desire to obtain absolute cleanliness with the least possible wear to the tooth surfaces.

The only time a dental engine should be used in this work is when it is necessary to grind cusps which cause malocclusion or to smooth any surfaces which have become etched or are starting to decay. When these places are sensitive, a 40 per cent. solution of silver nitrate should be applied, if discoloration is not objectionable, otherwise a 10 per cent. solution may be used; the latter discolors only where decalcification has set in. Deliquescent zinc chlorid or formaldehyd may be used with absolutely no danger of discoloration, but the latter must not be allowed to touch the soft tissues, for it causes severe pain, soreness, and sloughing. The hand polisher and wooden points are preferable in subsequent treatment, for a revolving rubber disk or brush wheel does the most wearing and polishing just exactly where the brush and cotton roll keep the teeth the cleanest. Moreover, if the revolving disk and brush wheel are allowed to touch the gums, they cut and cause scar tissue, which is sure to start recession.

DR. PICKERILL'S OPINION.

Dr. Pickerill says that acids will osmose through Nasmyth's membrane and cause decalcification, but thinks that with applied dietetics and with the use of acid mouth-washes, calcium salts can be made to predominate in the saliva; these salts, when they are held in solution by the presence of carbon dioxid, osmose through Nasmyth's membrane, and when the carbon dioxid passes off, they precipitate in the outer surface of the enamel, thereby hardening it and increasing its resistance to decay. He therefore discourages the polishing of tooth surfaces, for fear of damaging Nasmyth's membrane. I have never been able to discover anything like the hard, tough membrane Dr. Pickerill describes, and other investigators with whom I have discussed this subject give the same report. For protection against the accumulations which gather on the teeth of most people, I would rather depend upon the results obtained by keeping the surfaces clean and highly polished than upon the precipitation of calcium salts into the enamel through the agency of a few epithelial cells which cling to newly erupted teeth.

There are certain pathological conditions in which mouth-washes are indicated, but, ordinarily, if a mouth is kept clean, it is healthy, and I can see no

more reason for the daily use of a medicated mouth-wash than for the constant use of medicine by a healthy man.

Most powders and pastes contain a slight abrasive, a little soap, a mild disinfectant, and some kind of flavoring. Patients frequently ask, "What powder or paste shall I use?" My answer to this question is, usually, that I do not care so much what they use, as how they use it. In fact, the healthiest mouths in my practice are the ones in which I have polished the teeth with XXX silex and tin oxid, and had the patients follow this up with cotton rolls and tape for daily cleaning, also using the wooden points, intelligently, two or three times a week.

Clean mouths and clean teeth mean a higher moral, mental, and physical development, and three-quarters of the clean-mouth campaign is won when patients have become educated so as to realize that there is irritation when there is the slightest accumulation on the teeth or mucous membrane of the mouth.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE EVOLUTION OF TEETH-FILLING.

By WM. CRENSHAW, D.D.S., Atlanta, Ga.

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, Pa., June 24, 1913.)

THE evolution of teeth-filling necessarily depends upon finite intelligence, exactly as does the development of electrical science, of structural engineering, or of music. Consequently we must not hope to see exemplified in the evolution of dental art that orderliness and precision of progress so beautifully interpreted in the writings of Darwin. Progress conditioned by finite minds may proceed along lines either right or wrong, because human intelligence is itself finite. So it is, and must be, that when we, in our limited perceptions, undertake to restore by repair or reconstruction the performance of an organ of divine creation, we come face to face with our limitations, and find that we as often proceed on a wrong judgment as upon a correct one.

EARLY EFFORTS TOWARD SYSTEMATIZATION.

Up to the time of the efforts of Marshall H. Webb, beginning some forty years ago, no one had brought forward a system or presented an outline of methods that had promise of eventuating in a system of filling teeth. Dr. Robert Arthur, contemporaneous with Webb, brought to the attention of the dental world the application of the cohesive attribute of gold foil, which, along with the application of the rubber dam by Dr. Barnum, marked steps toward the development of a system of greater importance than either of these benefactors knew, because of the ends these contributions subserved in Webb's propaganda of contour restoration and prevention of extension. These steps, taken at the time when the art of teeth filling was well-nigh vanquished, cleared away the darkness and gloom of discouragement. The world was blessed, and its benefactors immortalized.

MARSHALL H. WEBB'S MERITS IN TEETH RESTORATION.

Prior to Webb's efforts, no one had brought forward a system or presented the outline of methods that promised

emancipation from the chaotic condition in which teeth-filling stood. So that here we had given to the world the first distinctively original—and all but standardized—system for filling teeth, a system culminating in anatomical restoration of the organs with which it deals.

In August 1881, on the third day of the International Medical Congress, meeting in London, in the section on Diseases of the Teeth, Marshall H. Webb of Lancaster, Pa., read his paper on "Restoration of Contour and Prevention of Extension of Decay," in which the following paragraph occurs: "To prevent decay, operations must be performed in such manner as to have the margin of enamel free from contact with the adjoining tooth. The enamel around a cavity and the approximal wall of a bicuspid or molar tooth should be cut away toward buccal and palatal or lingual walls sufficiently to insure the freedom of the margin when the operation is completed."

In the declaration of this one paragraph was made greater progress toward placing the operative feature of dentistry upon a scientific basis than in all else that had gone before. Think of the far-reaching effect of the recovery to the human economy of masticatory organs, and the placing of them in normal occlusion; of making possible a restored gum festoon, of the contour restoration, of the comfort and the strength of the result, and tell me if ever poet or painter gave to the world a conception of greater beauty or value to mankind.

The artist is great who delineates human features in perfect detail and lifelike suggestiveness, but the surgeon who redeems an organ of mastication from destruction, and restores it to the use of the human economy, and thus aids in retaining the divinity and the beauty of the face, is akin at least to the divine; and today immortal Webb wears a well-won crown, gladly placed upon his brow by his co-laborers, and glorified by God himself.

Ten years or so after Webb had finished his work and had gone, it was discovered that cementum and dentin made unsafe foundations under cohesive gold; and following upon this came the announcement of Prof. Henry S. Chase that, in proportion as teeth needed to be saved, gold—meaning cohesive gold—was the poorest material with which to do it.

NON-COHESIVE GOLD FOR FILLING APPROXIMAL CAVITIES IN POSTERIOR TEETH.

In filling approximal surfaces of molars and bicuspids, we encounter the most difficult class of filling operations to be made, because of inaccessibility and because, at the cervical margin, the tissues are of varying and unsubstantial nature. At the cervical margin of the average cavity between such teeth, we encounter a foundation of cementum and dentin—structures composed of little less than one-third of organic or nerve tissue, and some more than two-thirds of intertubular substance—calcium phosphate and carbonate. On account of this combination of nerve fibers and the low resistance to decay of this and the intertubular substance, cementum and dentin as a foundation base are unsuited for permanently successful adaptation of cohesive gold. These structures do not afford the resistance necessary for the adaptation of a crystalline gold, and we have therefore crystalline gold laid upon a foundation one-third of which is nerve fibers, probably weeping moisture in the joint or drawing it in from without by capillary attraction, owing to this form of gold and the likelihood of chafing or of fracturing the cervix angle of these cavities from malleting.

Soft or non-cohesive gold foil and tin foil, both of which are non-crystalline in form, adapt themselves by reason of their soft, laminæ-like folds to the soft and partially vascular dentin and cementum, after the fashion of a cork being compressed into the mouth of a bottle, and for this reason these materials are made to conform more perfectly to the floor and walls of a cavity in such structures. Cohesive gold, because of its crystalline nature unyielding and an-

gular, does not and cannot be adapted with the same facility for making moisture-proof joints at these points.

Many practitioners very likely have a personal knowledge of the manner in which soft gold was made to preserve teeth back in the '60's and '70's. Among the men who achieved lifelong preservation of teeth with soft gold were Dr. Maynard of Washington, a notable figure in this section of the country, Dr. Emerson of Macon, Ga., Drs. Badger brothers of Atlanta, and others. These men knew how to adapt soft gold in cavities extending under the gum into dentin and cementum. This work has been found to be in a state of preservation for from forty to fifty years. Some of these fillings were made of a twist or rope of soft foil folded back and forth and closed up by a compression of not very great degree, because there were not then adequately constructed devices with which to corner and condense it. But the work of these men served to show what could be done with this form of gold.

COMBINATION OF COHESIVE AND NON-COHESIVE GOLD FOR CERVICAL CAVITIES.

These facts were significant, and too important to let pass. They have therefore been turned to account by the use of such devices as enable us to control and compel soft foil, tin foil, and amalgam to be adapted as desired at that most difficult and important point within the range of teeth-filling—the cervical margin at and beneath the gum.

In the employment of a combination of soft and cohesive golds, the soft gold is placed in the cervical part of the cavity, where from experience and trial it has served and saved best, and where, by the compression of cushions of foil upon the margins, we eliminate the danger of chafing or in anywise fracturing them; the cohesive is placed as a capping and finishing where it may be adapted against heavy enamel margins, and where, owing to the density of the enamel and the homogeneity and tensile strength of cohesive gold, a permanent and successful adaptation to enamel walls is made.

A CLASSIC INSTANCE OF THE BEHAVIOR OF COHESIVE GOLD IN A CERVICAL CAVITY.

In October of 1881, Marshall H. Webb made for Dr. W. G. Browne of Atlanta, in demonstration of his propaganda, an operation on an upper first molar with cohesive gold and electric mallet. The cavity preparation extended beneath the gum and beyond the enamel border and covered the anterior approximal wall and about two-thirds of the masticatory surface of the tooth, exemplifying fully the Webb idea of prevention of extension of decay and of anatomical contour. Twelve or fifteen years elapsed, when it was discovered that the cervical margin in the cementum was giving way, and decay had set in and was progressing destructively. This served to show the results of cohesive gold at the margin beneath the gum, and the instance was more noticeable and convincing because the work had been done by the finest skill the world then knew.

This work at the cervical margin of these teeth with cohesive gold is perhaps the most difficult and exacting of anything done in operative dentistry; but the devices we now have, plus soft foil of gold or tin, or amalgam alloys, transform it into the simplest, most perfect and most permanent of dental filling achievements.

THE PORCELAIN INLAY.

The step in the evolution of teeth filling that has made the profoundest impression within the last forty years is the porcelain inlay. This, like the gold inlay, and like fillings of all kinds, has its limitations, particularly with reference to location; but if used with discrimination and judgment, it is a thing of beauty and a joy as long as it stays in.

THE CAST GOLD INLAY AND ITS SHORTCOMINGS.

The use of cast gold inlays for operative work has its uses and abuses. The reconstruction of broken-down crowns,

the casting of close joints between the root and tooth in pivot crowns, the large filling operations with margins above the gums, are instances of its great value. But cast inlays, whether of gold or porcelain, are and always have been handicapped by the interstitial space and the bonding material. These inlays are only as good as the bonding material; and inasmuch as margins extend almost invariably to the gum and beneath it, the fillings fail owing to the softening and disintegration of the cement film surrounding the inlay beneath the gum.

The shrinkage of the gold inlay has not been satisfactorily overcome. By tests it is shown that, in the large cavities where shrinkage is most damaging, it is greatest, and failure proportionately great.

Nothing more degenerative in the art of filling teeth has come forward in forty years than the placing of cast inlays beneath the gum, particularly in the heavy operations between molars and bicuspids. Even the wisest practitioners have not always been able to give each innovation its just valuation, or to determine what was best. The cast inlay so simplifies and expedites the operation of filling, and it can be made to so embody the Webb propaganda, in appearance at least, that the man who believes cement to be a permanent bonding material is easily led into its adoption. Just as the typewriter threatens to extinguish chirography, so the made-to-order inlay, crown, and bridge bid fair to relegate this part of our calling to the limbo of lost arts. But enough is known to forbid employing the cast inlay between the teeth as cited, because, if employed at these points, it rivals the shell crown in destroying instead of saving the teeth.

AMALGAM IN LARGE APPROXIMAL FILLINGS.

The placing of amalgam alloy beneath the gum in the heavy operations between molars and bicuspids has proved to be a method superior to the gold inlay or cohesive gold at these points; and if more time and pains were taken to do amalgam work properly, instead of slighting it because of the cheapness of this material, the patient and the operator would be benefited alike.

Amalgam alloy has held its place as a filling material, because it is now made more reliable and is of higher grade than it was in former years, and because more teeth are saved with it than with any other filling material used within the time under review.

In conclusion, let me note that, viewing the evolution of teeth-filling through a perspective of half a century, we are forced to admit that, since the discoveries of Arthur, Barnum, and Webb, the gain has been esthetic rather than substantial, and that we have improved appearance at the expense of permanence.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

PROCEEDINGS OF SOCIETIES.

NATIONAL DENTAL ASSOCIATION.

Seventeenth Annual Meeting, held at Kansas City, Mo., July 8 to 11, 1913.

(Continued from page 206.)

THE CLINICS.

Report of the Chairman of the Clinic Committee.

By Dr. J. V. CONZETT, Dubuque, Iowa.

THE clinical program for the convention of 1913 was an experiment in some respects, but proved to be all that the friends of the experiment hoped for. In point of attendance and educational value we believe that its success was unqualified, so much so that the chairman has decided to arrange for a clinic of the same sort for the meeting at Rochester—in which, however, he will attempt to enlarge and refine the methods used, and make certain changes which experience has shown to be wise.

The clinics were divided into two sections of one-half day each, the morning clinic being a progressive one, following out the plan devised by Dr. Weston A. Price and used with great success at the Ohio State meeting, and after that at other meetings. The plan was to divide the convention into three sections of ten groups each and to have a clinician for each group. Every group thus had a clinician to watch for a period of fifteen minutes, after which time, at a given signal, each group moved on to the next clinic and a new group took the place of the old at each post. In this way every participant in the convention had the opportunity of seeing each clinic to the best advantage, and every clinician had the opportunity of reaching every participant in the convention with his special message.

In the afternoon a general clinic was held, which was divided into ten sections, each section under the chairmanship of a member of the clinic committee. These sections were classified into the different specialties of dentistry; for example, there was a section on gold fillings, one on inlays, one on orthodontia, etc., covering the ten phases of professional activity. This plan made it possible for the man who wanted to study the methods of some one phase of dentistry to go to that section and find grouped together in one place all that the convention offered on that subject; or, if a man wanted to see something of all phases of dental professional activity, he was enabled to go from group to group at his pleasure. Thus, with both plans in operation, it was possible to satisfy all classes of seekers after truth.

The chairman desires to thank the members of his committee who worked so faithfully and made the success of the clinic possible. He also wishes to express his sense of great obligation to the local committee men under the chairmanship of Dr. C. C. Allen, whose untiring efforts and intelligent planning made possible the carrying-out of the plans which the clinic committee put into operation at the convention.

Respectfully submitted,
J. V. CONZETT, *Chairman.*

Orthodontia.

Orthodontia. (By Dr. M. F. Finley, Washington, D. C.)

Dr. Finley demonstrated the use of the Jackson system in rotating upper central incisors, bands being cemented to the teeth with vertical tubes, using the double U or staple, which is removable; also the moving of a single tooth by means of finger-springs attached to the basic appliance.

The clinician also showed again the case presented at the Denver meeting, in which there was absence of all the bicuspids and no germs for the second and third molars, leaving the patient with a permanent denture of sixteen teeth and four deciduous molars.

Models were also shown with appliances attached for spreading the upper arch in a case of distal occlusion in a patient of ten years of age, which resulted in relieving the condition of contracted nasal space and constant tendency to nasal catarrhal colds.

Adjustment of the Brady Appliances. (By Dr. T. G. Duckworth, Kansas City, Mo.)

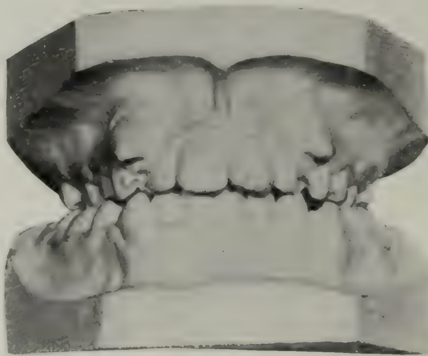
The Brady appliances consist of the expansion arch and the contoured clamp molar band, the clamping device of which is on the buccal side. In the adjustment of the molar bands, very little contouring is to be done, and a perfect adaptation can be secured. The arch is bent to conform to the teeth on the models. The molar bands are then placed upon the arch and placed in the mouth, the arch being the means of securing the alinement. There need be no previous separation of the teeth, as the bands will slip in between the contact points, providing the proper adjustment is made. The clamping device on the buccal side of the molar band is to be recommended, as it is so protected by a sheath that it is not irritating to the cheek, and attachments can be made upon the lingual side. The arch and bands are placed on the teeth at one time, but allowed to remain passive for a few days, before any attempt is made to apply force.

An Appliance for Moving the Roots of Teeth. (By Dr. Horace L. Howe, Boston, Mass.)

Fig. 1 shows the appliance in position. It consists of the regular 18-gage expansion arch of platinized gold, to which are soldered vertical uprights of 21-gage platinized gold wire. At the extremities of the uprights open loops are formed so as to present a non-irritating surface to the lips, also to allow of easy application of ligatures which are tied around the teeth near the gums.

Fig. 1.

Fig. 2.



Before tying, the uprights should be so bent that the extremities stand away from the necks of the teeth, toward which the uprights should be sprung in tying. It is sometimes advantageous to band the teeth to be moved, in order to prevent the ligatures from slipping.

The spring of the uprights, together with the torsion of the arch wire, affords a gentle stimulating force which produces truly wonderful action in making slanting teeth perpendicular.

Fig. 2 shows the case before treatment. In ten months, the change shown in Fig. 1 was brought about.

This appliance is very easily adjusted and at the same time positive in its action.

ORTHODONTIA AND ORTHOPEDIA OF THE FACE. (By Dr. V. H. JACKSON, New York, N. Y.)

[Dr. Jackson presented forty models and appliances illustrating his methods, as described in the issue of the COSMOS for February, at page 112.]

Oral Prophylaxis and Pyorrhea Alveolaris.

ORAL PROPHYLAXIS IN THE TREATMENT OF INTERSTITIAL GINGIVITIS. (By Dr. CHARLES P. WOOD, Detroit, Mich.)

Dr. Wood treated a case of pericemental abscess with the Carr set of planes. At first the case was thought to be an ordinary alveolar abscess from a devitalized tooth, but, upon drilling sufficiently to make sure that the tooth had a vital pulp, further examination disclosed a pocket beginning at the lingual border and extending laterally to the labial surface near the apex, and ending in the fistula. The clinician removed considerable black scale and planed the root surface until it was smooth, and predicted that there would be no recurrence of the abscess. Dr. Wood believes that pyorrhea can be and is cured permanently every day by many operators by local instrumentation, when proper care is given to the mouth and the root surfaces after treatment.

CASES TREATED FOR PYORRHEA. (By Dr. J. D. PATTERSON, Kansas City, Mo.)

The patient, Mr. B., applied for treatment in 1904 with the following conditions: The teeth were free from caries, and were all seriously affected with pyorrhea. The lower left teeth were so loose that they could be removed without forceps, and the process had been partially sequestered; the jaw was badly swollen. First, all of the lower left teeth were removed, together with large amounts of necrosed process. Subsequently the swelling, pus production, and infiltration became so great that an opening was made outside, and after several months, during which time the remaining portions of the alveolar process were removed and the bone was deeply curetted, healing finally resulted, with much facial deformity. This deformity was corrected with a removable appliance attached to the remaining teeth, which made a complete recovery under treatment, and have remained sound.

This clinic was given to demonstrate that necrosis is sometimes caused by pyorrhea alone, when the teeth are sound and vital; also to show a perfect recovery of health in the remaining teeth which were loose and on the verge of being in hopeless condition. It showed also a perfect restoration of masticating surfaces and of facial contour by the artificial jaw, which is worn with perfect comfort. The opening necessary for the evacuation of the pus on the outside was made under the jaw, and the scar is thus concealed.

TECHNIQUE OF INSTRUMENTATION IN THE SURGICAL TREATMENT OF RIGGS' DISEASE. SCALING ROOTS AND BIFURCATIONS BETWEEN MOLAR ROOTS. REMOVAL OF CARIOUS BONE FROM SOCKETS. (By Dr. J. J. SARRAZIN, New Orleans, La.)

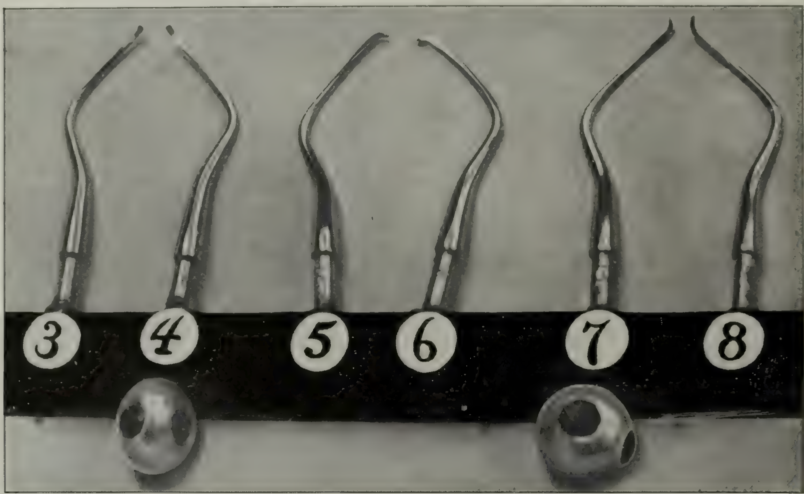
Calcarious or exposed deposits are to be removed by any heavy scalers with which the operator will do thorough work on root necks or visible parts of roots.

Root-scaling beyond the gum lines, with the exception of upper anterior roots, can be universally done by the original instruments, Nos. 3 and 4, as illustrated (next page). Besides giving complete peripheral axial access on roots, instruments Nos. 3 and 4 effectively scale into buccal bifurcations between

upper molar roots, and also into lingual and buccal bifurcations between lower molar roots.

Distal bifurcations between upper molar roots are best scaled by Nos. 5 and 6 being used in addition, while the same two instruments give most gratifying access lingually of long or reclining lower incisors, reaching deeply on their roots. They give great help distally of lower molars also.

Small round burs, Nos. 1 and 2, made twenty-one sixteenths of an inch long over all, and run in an adjustable angle handpiece, are used to remove carious bone from sockets. They can be placed at any angle desired, and their length allows unlimited access for the purpose, even in distant places between and around molar roots, both above and below. Round burs in a straight handpiece can be used to advantage for the



same purpose only around the roots of upper anterior teeth. Angle burs of usual length lack reach.

In upper second bicuspids instruments Nos. 7 and 8 are needed to scale properly into the mesial bifurcation between upper molar roots, using them in addition to Nos. 3 and 4. They are used mesially of lower molars also.

Aluminum finger-rest knobs are placed on the handles of the instrument points here illustrated—and as mentioned on page 300 of the 1912 Transactions of the National Dental Association; they allow of sterilization by heat, and give the necessary power to the points and side blades of the instruments by their being brought very nearly within the circumference of the knobs, which also increase accuracy of touch by extending the surface of contact with spatulated nerve fibrils on which the tactile sense at the tips of fingers depends. Perishable knobs have heretofore been used.

(A) Temporary Retention of Loose Teeth. (B) Concealed Retaining Splint. (By Dr. Chas. A. Priest, Marion, Ind.)

(A) A ligature wire is placed loosely around all teeth to be retained, and pressed slightly into the interproximal spaces, both on the lingual and labial sides of the teeth. Then, with short pieces of the ligature wire, the labial and lingual wires are bound together between the teeth, twisting the short binding wires until they are tight. This will hold the teeth much more securely than if the wire is woven in and out between the teeth.

(B) This is made by making post

inlays to fit cavities cut on the lingual side of teeth. The inlays are soldered together, and set as one piece.

Ammonium Fluorid Treatment for Pyorrhea. (By Dr. L. P. Davis, Lincoln, Nebr.)

It is only recently that anything other than instrumentation has been used for the removal of calcarious deposits from the teeth. Numerous medicinal agents were tried from time to time, but their use was discontinued owing to their injurious action upon the enamel and gum tissue. Most of the tartar solvents that were used contained either hydrochloric or sulfuric acid in such proportions as were absolutely injurious to tooth structure, and after a careful observation of their action they were discarded. Where tartar scales are confined to the roots of teeth alone, instrumentation will remove them, but this is always accompanied by much pain and hemorrhage.

It has been proved that tartar becomes more or less embedded in the gum tissue, and no amount of instrumentation will remove it without real damage to the soft tissues. Ammonium fluorid has been found not only to be a very sufficient cleaning agent and stain-remover for the teeth, but a most effective remedy for the treatment of pyorrhea, especially in severe cases where large quantities of pus surround the teeth, and pockets are deep-seated and inflamed.

In using this agent in such cases, the first step consists in as much instrumentation as possible. This treatment is followed by filling the pockets of the infected teeth with the agent and syringing each pocket out thoroughly, by extending the needle well into the pus pockets. The patient may then rinse the mouth with water, this rinsing to be followed by an alkaline mouth-wash, such as milk of magnesia.

The patient should return in four or five days for another treatment. It will be found at this time that the deposits remaining on the teeth are much more easily removed than at the time of the first treatment, that the gums look more firm and healthy, and that the amount of pus is greatly diminished. The second treatment should be administered in the same way as the first.

It will only be necessary to treat such cases three or four times, when the pus will have disappeared and the gums returned to a normal condition. Teeth that are loose and very sore will be tightened by the use of this agent, and the soreness will disappear.

The medicament is used full strength as it comes in the vial. No hesitation should be felt in syringing each pocket or infected area thoroughly, as this drug has no harmful effect on the hard or soft tissues of the mouth, especially when followed by an alkaline mouth-wash.

Early Recognition and Prevention of Pericemental Diseases, and the Blood-clot Method of Curing the Pyorrheal Stages. (By Dr. T. Sydney Smith, Palo Alto, Cal.)

The clinician called attention to the fact that, since a large percentage of systemic diseases have their origin in the oral cavity, we should no longer confine our attentions to the repair of the teeth. We should recognize the necessity of that which is of still greater importance, viz, the preservation of the health of the structures supporting the teeth. This special care of the gums becomes more imperative since the treatment which is necessary for maintaining their health will also prevent nearly all of the destruction of the crowns.

It was pointed out that the special form which nature gave to the supporting structure of the teeth is extremely necessary to permit them to perform their function, that this need does not lessen with age, and that any change in form after the teeth are fully matured must be regarded as the result of pathological conditions.

It was also pointed out that we cannot sterilize the mouth by the use of medicinal agents. These merely inhibit nature's own protective forces. We can, however, make the mouth unfavorable for the development of micro-organisms by producing and maintaining a high polish on the surface of the enamel, especially on the approximal sides and underneath

the free margin of the gingivæ. We can also make the gums extremely resistant by applying the sort of stimulation which nature intended them to receive, that is, by brushing them with a stroke which comes chiefly from the direction of the crowns.

We must be trained to detect even the faintest change in either the color or form of the gingivæ and immediately remove the cause from the gingival sulcus.

If pyorrheal pockets are present, they should be cured by inducing a vital reattachment of the separated tissues. The reattachment of the gums to vital teeth can be secured by employing the same general principles of surgery which we regard as necessary to permit a healing to take place in other parts of the body. This certainly forbids the introduction of acids and germicides or even of flour of pumice into the wound. All of the tissues, including the blood, must be permitted to take part in the healing. It may therefore be called the blood-clot method, not because there is more hemorrhage, but because the blood is not destroyed. We should always keep the wound as small as possible, for small wounds are certainly more easily healed.

This method of healing has the advantage of being rapid. It also prevents any further recession of the gingival tissues while the cure is being effected.

Instructions for Oral Prophylaxis and Pyorrhea Patients. (By Dr. Grace Rogers Spalding, Detroit, Mich.)

EQUIPMENT.

Brushes. Shape: Must be selected by the dentist to meet individual needs. Bristles: Medium quality. Number: Patient must have enough brushes so that each one will be used but once each day.

Dental floss: Flat ribbon floss; must be wide enough to be useful in removing bacterial plaques as well as food particles.

Tooth-powder: Adapted to meet the needs of the patient. Must be recommended by the dentist, who knows the contents of the powder, and, from experience, the action of the various ingredients.

Mouth-wash: Also prescribed by the dentist to suit the needs of the case only when he knows the contents and the action of the ingredients.

Toothpicks: Alpine wood or orange-wood. Useful in a few cases, but patients must understand their use.

Tongue-scraper: One that can be sterilized.

Mirrors: Two are necessary—one a mouth-mirror with which the patient can examine his mouth, the other to be hung in the bathroom over the wash-stand.

Instrument for *gum massage.*

PROPHYLAXIS PATIENTS: CHILDREN.

From 2 to 5 years. Brushes: 1 and 2 rows of bristles. Floss: Small size, to be used where teeth are in contact. Abrasive: Paste and powder mixed. Mouth-wash: Alkaline antiseptic, mild.

From 5 to 12 years. Brushes: 2 and 3 rows of bristles and circular brush. Floss: Use of floss is important. Abrasive: Powder, rather coarse. Mouth-wash: Astringent. Tongue-scraper.

From 12 to 18 years. Brushes: 3 and 4 rows of bristles and circular brush. Floss: Flat ribbon floss, width *R.* Abrasive: Tooth-powder. Mouth-wash: Alkaline. Tongue-scraper.

Unusual mouth conditions; orthodontia cases. Brushes: To the brushes of the usual class add a circular brush for the first and second molars (permanent), also a baby brush with a single row of bristles. Toothpicks: Flat and smooth. Floss: Use where possible, usually between incisors. Tooth-powder: Coarse. Mouth-wash: Astringent.

ADULTS.

Normal mouth conditions. Brushes: Selection as to size varies with length of crowns and size of mouth. Floss: Ribbon floss *R.* In rare instances *T.* Abrasive: Tooth-powder. Mouth-wash: Alkaline. Tongue-scraper.

Exceptions; gums receded and teeth missing. Brushes: Where gums have re-

ceded, to the supply of brushes a brush of one row of bristles is added to care for exposed root surfaces. Floss: Unwaxed *R* is best to use on approximal and distal surfaces of teeth facing a space or where there has been much recession. Abrasive: Tooth-powder of fine grit to insure against wearing the exposed root surface. Mouth-wash: Astringent. Tongue-scraper. Instrument for gum massage.

Missing teeth replaced by artificial appliances, fixed bridges, etc. Brushes: Specially shaped for bridges. Tooth-powder: Heavy. Floss: Use in a carrier between appliance and gum. Mouth-wash: Astringent. Tongue-scraper. Instrument for gum massage.

GENERAL RULES FOR THE CARE OF THE MOUTH.

How often shall I brush my teeth? As many times as you partake of food, and whenever possible within an hour after eating.

How shall I brush them? Never crosswise. Either use circular or vertical motions in brushing; if the latter, downward on upper teeth, upward on lower teeth.

What kind of a brush shall I use? Use at least two shapes of brushes, these to be selected by your dentist to meet your individual needs.

What kind of powder is best? A powder which will not wear the tooth surface, but which will be sufficiently abrasive to remove mucous coatings and bacterial plaques. This should be prescribed by your dentist.

When shall I use dental floss? This is just as important as the tooth-brush and should be used as often. It must be intelligently used or will prove very destructive. Your dentist must instruct you in the use of the dental floss.

How often shall I use a mouth-wash? A mouth-wash is of little value compared with the tooth-brush and dental floss, but is an aid in maintaining a wholesome condition of the mouth and throat. Rinse the mouth and gargle the throat before breakfast in the morning and just before retiring at night, with an alkaline antiseptic.

Is a tongue-scraper necessary? Before breakfast in the morning use a tongue-scraper before a mirror, and you will see the need of its daily use.

Do I need to massage my gums? If your gums have receded or the circulation is sluggish.

What other suggestions can you give me? None without seeing your mouth. Each case requires special instruction.

Anesthesia and Analgesia.

NITROUS OXID AND OXYGEN ANALGESIA. (By Dr. G. N. WASSER, Cleveland, Ohio.)

Dr. Wasser administered nitrous oxid and oxygen to fifteen different dentists, inducing satisfactory analgesia in each case.

INSTRUCTION IN SOMNOFORM ANALGESIA INDUCTION. (By Dr. W. H. DEFORD, Des Moines, Ia.)

This clinic consisted in practical instruction in the induction of analgesia by somnoform. Many dentists availed themselves of this opportunity to inhale somnoform to the stage of analgesia, thus acquainting themselves with the symptoms and state of the patient when analgesia is induced for various painful conditions in everyday practice. The methods of induction were dwelt upon and explained, the clinician using for this purpose the appliance known as the DeFord inhaler.

NITROUS OXID AND OXYGEN ANALGESIA AND ANESTHESIA. (By Dr. J. STEWART JACKSON, Denver, Colo.)

The clinician administered nitrous oxid and oxygen to five patients, with very satisfactory results. He removed six roots in a woman, demonstrating the use of the elevator, the patient remaining in the analgesic stage during the operation without discomfort, the sensory nerves only being acted upon. The clinician also anesthetized a man of sixty-five years and removed fourteen roots, keeping the patient in an even anesthetic stage during the entire time. He also used oxygen to revive the patients or to drive the nitrous oxygen

out of the system. No discomfort or after-effect was observed in any of the cases.

Nitrous Oxid and Oxygen Anesthesia and Analgesia. (By Dr. W. C. Teter, Cleveland, Ohio.)

This clinic consisted in the administration of nitrous oxid and oxygen for the extracting of teeth. In each of the ten cases treated the patient was anesthetized by the nasal administration of nitrous oxid and oxygen. After anesthesia was induced, sterile gauze sponges were placed in the back of the mouth for three reasons: First, to prevent mouth-breathing; second, to absorb the blood and keep it from flowing down the throat, and third, to prevent the possible chance of a tooth or fragment thereof getting into the throat.

The extracting was carefully done, causing as little injury as possible to the soft tissues of the mouth. This is a much-overlooked feature, largely owing to the fact that most operators do not prolong the anesthesia properly, enabling them to extract more carefully.

In all the cases operated upon there was perfect anesthesia, and ample time was secured for the careful extraction of from one to ten teeth.

Oral Surgery.

Cleft-Palate Operation. (By Dr. W. H. G. Logan, Chicago, Ill.)

Dr. Logan performed two cleft-palate operations.

Cleft-Palate Operation. (By Dr. Truman W. Brophy, Chicago, Ill.)

Dr. Brophy operated upon seven patients, five of whom had cleft palates and two hare-lips.

Root-Amputation. (By Dr. Carl D. Lucas, Indianapolis, Ind.)

The patient was a woman of forty-five years, fair, very nervous, anemic, with a chronic alveolar abscess with fistulous opening at the apex of the upper left canine, of six months' standing. The usual therapeutic measures had been employed previously, without eradication of the disease. X-ray examination confirmed the diagnosis.

The mouth was rendered sterile with a solution of phenolized water. A local anesthetic, codrenin, was injected into the pericemental membrane on all sides of the root, using a surgical hypodermic needle, 28 gage, one and one-half inches long. After the pericemental tissue had become thoroughly infiltrated, the needle was inserted into the fibrous pus sac at the apex, and this and the surrounding hypertrophied tissue thoroughly infiltrated. A line incision was then made, one and three-quarter inches long, parallel to the root. The soft tissues, gum, and periosteum were dissected 25 mm. in all directions beyond the fistulous opening in the labial plate of the alveolar process. The Buckley wound-retractor was applied, and the flaps were well retracted. The labial process was dissected laterally and vertically to the edges by plastic dissection, thereby exposing the apical third of the root. A straight-blade fissure bur—a cross-cut bur should never be used here—was employed, and the apical third excised. The excised portion was carefully removed, and with the aid of cylindrical carborundum stones, the mesial, distal, and labial surfaces of the remaining root were perfectly rounded. The lingual surface was rounded with a round bur, using a pulling motion, the portion of the blades next to the bur shank performing this function. The wound was thoroughly irrigated with a solution of phenol, eight drops to three ounces of distilled water.

The margins of necrotic process were burred and curetted away, by using large spoon curets, and the wound thoroughly irrigated with the above solution. The retractor was removed, the wound packed with half-inch iodoform gauze, and the patient dismissed, with instructions to return to an assistant daily until dismissed.

Post-operative treatment. The packing must be removed each day for a period of one week, the wound irrigated with the phenol solution as above indicated, and then repacked with

iodoform gauze. The second week the wound should be irrigated each day, but the packing may be discontinued. After the third week, the wound should be irrigated every second day until healed and closed.

Prosthodontia.

The Use of the Snow Face-bow in Mounting the Wax Occlusion and Contour Models. (By Dr. George H. Wilson, Cleveland, Ohio.)

Dr. Wilson demonstrated the mounting of the casts and wax occlusion and contour models on the Snow articulator by the aid of the face-bow. The face-bow does two things—transfers the three points of the Bonwill triangle and the occlusal plane of the patient to the articulator.

Time-savers in Prosthodontia. (By Dr. J. H. Solecki, Topeka, Kans.)

This clinic was given to show how a busy dentist can save many hours in prosthetic work. The clinic was divided into two parts:

(1) *Low-fusing Metal Inlays for Posterior Teeth Instead of Amalgam Fillings.* The clinician claims that the basis of any good low-fusing metal being pure tin, this material is far superior to the best amalgam. The broken-down molar or bicuspid can be better restored by an inlay than by an amalgam filling. By the following process, an inlay can be made in as short a time as a good amalgam filling:

The clinician casts inlays by centrifugal force. A simple device, on the order of a circle swing, will cast as many inlays as there are tin cups suspended from a wheel on a chain. The top of an old sewing machine is an ideal device for this purpose. Two, three, or four small tin cans suspended on a chain can be swung around, and thus as many inlays cast of low-fusing metal at a time. The wax impression is invested in a rubber ring instead of a steel ring, hence there is no waiting for the case to dry out, but it is put on a hot fire as soon as the investment has set enough to allow of handling. By the aid of this procedure four or more inlays can be inserted at the same sitting. This process can also be applied for gold inlays; here, however, a spring device is required to force the gold into the matrix.

(2) *Constructing an Artificial Denture Within Two Hours Without Vulcanizing.* After the teeth are articulated in the usual manner, the model is removed from the articulator. A piece of wax is placed at each heel to serve as a sprue, investment is mixed in a rubber bowl, and the case dipped into it, leaving the sprues exposed; as soon as the invesment has set enough to allow of handling, the case is taken out of the bowl and set over a fire. After the wax has burned out, the case is removed from the fire and set in an upright position, and low-fusing metal is poured from a ladle into one opening, until it comes out of the other.

The clinician uses "Molarine" low-fusing metal for all such work; it is his own product, and assured to be pure.

Gold Fillings.

Gold Filling in the Disto-incisal Surface of an Upper Bicuspid. (By Dr. William Finn, Cedar Rapids, Iowa.)

Owing to failure to secure a patient, Dr. Finn demonstrated his method with a plaster model.

Combination Method of Filling Bicuspids and Molars with Gold Foil by the Use of Cohesive and Noncohesive Gold. (Black's Method.) (By Dr. J. W. S. Gallagher, Winona, Minn.)

As the clinic in this section was a progressive one, it seemed impracticable to make a chair clinic of a gold foil operation, when a new set of observers would be at the chair every fifteen minutes. As each observer in this case would see but a small part of the operator's work, it seemed unfair both to him and to those interested in the demonstration to attempt a clinic of this kind.

Dr. Gallagher deemed it wise, therefore, to make his operation on the pre-

ceding day, and to exhibit his patient on the day of the clinic. At the Kansas City Dental College, before a few especially interested in this work, and a number of students, he made a gold foil operation in the mesio-occlusal surface of an upper second molar.

On the day of the clinic, the finished operation was examined by each set of participants, and attention was called to extension for prevention, contour, contact, occlusion, and interproximal space.

In a plaster model the clinician showed the cavity preparation, laying particular stress upon having parallel walls, cutting through the enamel to the dentin so as to form a step, a flat pulpal wall, and a flat gingival seat.

By the use of sheet wax, worked into cylinders and pellets representing gold foil, the clinician filled the cavity in the plaster model, demonstrating the placing and condensation of the non-cohesive cylinders, the placing of cohesive pellets, stepping of the plugger point, direction of force, and method used in finishing the filling so as to secure the desired self-cleansing embrasures, preservation of the interproximal space, proper contour, and contact.

GOLD FILLING IN THE APPROXIMAL SURFACE OF AN INCISOR. (By Dr. W. R. CLACK, Mason City, Iowa.)

The filling operation involved the mesial surface of an upper right lateral incisor. A "pinhead" gold filling had been inserted in this cavity, without extension, about two years previously. About a year after, this filling had failed at the lingual margin, and had been repaired with amalgam. The filling was leaking so badly that a slight touch of the excavator dislodged it.

The pulp was not involved, and no separation had been made. The margins were extended in all directions, viz, gingivally, under the free margin of the gum, lingually, and labially to the marginal angles of these surfaces, and incisally to the middle third of the incisal third of the tooth. The cavity was filled with No. 4 soft gold, annealed at the time of using.

The gold was condensed by hand pressure, supplemented by the hand mallet. Separation was obtained by wedging the gold against the distal surface of the central incisor. When finished, the gingival margin of the filling extended under the free margin of the gum, and the other three margins were exposed to the excursions of food and the action of the tongue, the lips, and the toothbrush.

Gold Inlays.

MANIPULATION OF WAX IN INLAY WORK. (By Dr. WM. MULLIN, La Grange, Ill.)

Fine Swiss saws, such as are used in the laboratory, are employed as a means of handling the wax model after it has been carved and polished and is ready to be taken out of the cavity. A piece of the saw—about three-quarters of an inch in length—is picked up with the fingers or pliers, heated, and stuck into the wax model at the most convenient point. The wax flows around the teeth of the saw, and this is cooled at once without using water. The saw attaches itself to the wax so firmly as to afford perfect control of the model. If the piece of saw is not at the point where the sprue wire is desired, another piece of saw is heated and stuck into the wax model at the desired point. With hot pliers the saw not in use is removed, after a hollow sprue wire has been slipped over the one in use and sealed. The hollow sprue wire used by the clinician is made by having a jeweler drill an opening through the Taggart sprue wire. If the Taggart machine is not used, one can make a hollow sprue wire from orthodontia tubing of proper size. By this method the wax model can be handled easily and quickly without coming in contact with the hands, and there is no possible chance of heat changing the form of the model.

If it is desired to carve the wax or to add wax, the saw, with the model attached, is fastened into a broach-holder, and in this manner the wax model can be handled without fear of changing.

This method is very useful when mak-

ing a porcelain crown with cast base in a case where the bite is close. When the desired amount of porcelain is ground off and there is only a thin base of wax, the sprue wire can be attached by this method without changing the thin wax base.

METHOD OF REPAIRING, AND OTHER GOLD INLAY TECHNIQUE. (By Dr. CLARENCE O. SIMPSON, St. Louis, Mo.)

Faulty margins, particularly the gingival one, are repaired by finishing the inlay ready for cementation, removing it, cleansing and drying the cavity, then placing a small amount of thin cement or other adhesive on the gingival wall, and adjusting a suitable pellet of foil conforming to the discrepancy and extending over the margin. The inlay is then placed in the cavity, malleted to position, and removed without disturbing the condensed foil attached to the gingival wall. The cementation is then completed, and the foil projecting over the gingival margin is more thoroughly condensed by hand pressure, and finished with strips.

This method changes an imperfect inlay into a restoration comparing favorably with fillings in which tin or non-cohesive gold—materials considered ideal for that purpose—is used for the gingival third.

The essayist showed methods for reinforcing wax models with 22-karat clippings to prevent distortion in removal; also the technique of partially investing wax models so that they can be hollowed and carved without injury.

A binocular loop—a double-magnifying lens worn as spectacles and permitting free use of the hands—was demonstrated as an aid in examination, cavity preparation, and inlay work.

INDIRECT METHOD OF FILLING. (By Dr. T. B. MAGILL, Kansas City, Mo.)

The cavity is prepared as for an ordinary inlay, so that the impression will draw. Then a small piece of modeling compound is heated until it is pliant, worked to a cone shape with the fingers, and cooled. The point of the cone is then heated, and a compressed impression of the cavity and also of a small portion of the tooth beyond the margin, is taken, but not of any part which forms an undercut. In this impression a cement model is poured, being careful to carry the cement to every part of the impression. When the cement is thoroughly set, the modeling compound is softened in warm water, and the impression removed from the cement model. In this cement model a mat gold filling or a matrix for a porcelain inlay, or any indirect filling may be made.

The method used for the mat gold filling is as follows: The cement model, which is a duplicate of the tooth to be filled, has sufficient resistance to withstand the pressure necessary for inserting a good mat gold filling, provided the cement model has been perfectly embedded in a good-sized piece of modeling compound or sealing-wax. The cavity is filled with mat gold by hand pressure and mallet, and finished by filing and trimming. The cement model is detached by warming the compound. The finished filling, which is to be used as an inlay, is removed from the cement model by cutting the back of the cement model with a thin stone or saw.

A small amount of inlay cement is placed in the cavity of the tooth, and the inlay is pressed into place. The time required for making this filling is about twenty minutes.

GOLD INLAY OVER AMALGAM MODELS. (By Dr. R. M. HILFINGER, Winfield, Kans.)

This method of making gold inlays is especially applicable in cases of mesio-disto-occlusal cavities in bicuspids, viz, cases in which it is extremely difficult to make an accurate wax pattern in the mouth, and also to seat the inlay perfectly after it has been made. The cavity is prepared in the usual manner, cutting liberally so as to expose the margins to the brush, and being careful that the buccal and distal walls are not wider mesio-distally at the contact points than at the neck of the tooth. Then an impression of the tooth is taken with modeling compound held in an aluminum or

German silver ring. Next this impression is invested in plaster of Paris to strengthen it, and is then packed very carefully with copper amalgam which has been well amalgamated and softened. The copper amalgam is used because it can be reheated, and employed over and over again. After the amalgam has set, it is separated, leaving an amalgam model of the tooth from which an accurate wax pattern can be made. In investing the wax, it is better to use two sprues for large inlays, as this provides for more pressure at the gingival margins anteriorly and posteriorly. After the cast is made, the inlay is placed back upon the amalgam model, put into the swager, and given three or four sharp blows with a heavy hammer, which will seat it more perfectly than could be accomplished in the mouth from a direct impression; besides, when the inlay is in the amalgam model, the gingival margins can be seen, which is often not the case in the mouth. After the inlay has been swaged to place in the model, it will go to place in the tooth just as readily and accurately, if the process of making the amalgam model has been properly carried out. For the sake of obtaining the bite and contact points, the amalgam model is placed in a modeling compound impression and mounted on an articulator, although this is not often necessary, for by close observation of the case in hand, the bite and contact points can be made approximately correct without the articulator. If the contact points are not quite full enough, a little 22-karat solder can be flowed on the inlay.

Gold Inlay Technique Clinic. (By Dr. Edgar D. Coolidge, Chicago.)

There are three causes for failure in inlay work:

(1) Faulty cavity preparation; (2) faulty wax technique; (3) cements.

(1) *Faulty cavity preparation.* The tendency is to form cavities for inlays with walls diverging to such an extent as to weaken the resistant and retentive form of the cavity. Wax can be removed from cavities with parallel walls when moist with saliva, and a successful inlay can be made and fitted into such a cavity. The same principles of cavity preparation should be used for gold inlays as for foil fillings, and a cavity prepared for one should be equally as good for the other filling method. The cavo-surface angle should be beveled as much for an inlay as for a filling. Special attention should be given to the gingival cavo-surface angle to insure that it is carefully beveled.

(2) *Faulty wax technique.* This is the most treacherous part of the whole inlay process. It is difficult to see whether the wax gives a perfect impression of the cavity, and many times faults are overlooked. Unless an equal amount of pressure is brought to bear upon every part of the cavity, there will be a lack of adaptation of the wax which, though unnoticeable, will result in a deficiency between the inlay and the margin of the cavity. If the wax is softened to a fine point, leaving the base of the cone quite hard, it will aid in getting the wax into deep cavities. Should the wax not show a perfect impression when removed, a little softer wax may be added to the deficient part, and the impression pressed to place again. If the wax model shows a perfect impression of every part of the cavity and is carefully invested, the cast made therefrom will very seldom be deficient. Occasionally small imperfections will be found on the cast, which prevent it from going to place. It is not always easy to find these imperfections, but they are usually present when the inlay does not go to place. The advantage of the heavy bevel of the cavo-surface angle at the gingival margin is that the cast will have a slight overlap or extension of gold to protect the cement. Shrinkage of the metal is not the cause of failures in small inlays. Faults in the waxing are the cause of most failures. Large inlays may be usually made in sections, which will reduce the shrinkage of the metal to a minimum.

Cements. The cement will do its part if the operator does his. Although the cements on the market today will wash away in the saliva, yet, if they are protected by a properly fitting inlay, they will scarcely ever be the exclusive cause for failure.

Alloy Fillings.

METHOD OF MANIPULATING AMALGAM, WITH SPECIAL REFERENCE TO PACKING AND CONDENSING, USING A QUICK-SETTING ALLOY. (By Dr. J ALDEN BLISS, Ruthven, Iowa.)

Various methods of applying matrices were also shown, including the use of copper of 34 gage, held in position by silk ligatures. After the filling had set, it was dressed to form and polished, care being taken to restore the anatomical proportions.

AMALGAM TECHNIQUE. (By W. G. CRANDALL, Spencer, Iowa.)

The subject of amalgam deserves a great deal more attention than it is getting. A vast majority of fillings are being made today with amalgam, and as a rule, they are made with very little care or attention to detail. If the patient will not or cannot have a gold filling or inlay, very often an amalgam filling is made, being the cheapest possible substitute, or the quickest means of getting rid of the patient. It is possible, however, to save teeth with amalgam when it has become a practical impossibility to save them with other materials. The first consideration should be good cavity preparation. [At this point the clinician demonstrated cavities cut in large plaster teeth.]

The size of the cavity makes very little difference. The seat should always be flat, or at least not concave; the lateral walls should be at right angles to the seat, forming as nearly as possible a box for the filling.

Amalgam, unless used in large bulk, tends to flow or move under pressure, therefore, it requires slightly more retention than gold foil or inlays. Because of the tendency of the material to fracture under heavy stress, its margins, wherever stress is brought to bear, should be at right angles as nearly as possible, but in no case should short or unprotected enamel rods be left at the margins. Wherever a cusp or wall is found at all weak, if it has to bear any amount of stress, it should be ground down far enough to insure sufficient bulk of amalgam for safety. It is no longer a question of esthetics, when a cavity is so large that the occlusal surface is entirely involved. Whenever it becomes necessary, therefore, to protect walls or cusps by grinding, they should be protected sufficiently, because the larger the bulk of amalgam, the stronger the filling will be, and the less it will flow.

The clinician then showed samples of amalgam crowns. These he makes in many instances in preference to gold crowns, for the gingival adaptation is so perfect that much less irritation results than if any other form of restoration is employed. The cavity preparation is very simple; usually, in teeth requiring so extensive a restoration, the pulp has become involved so that the pulp chamber may be used as an auxiliary anchorage. The gingival seats, both mesial and distal, are prepared in the same way as in large mesio-occluso-distal cavities; the buccal and lingual walls are then reduced to the point which the operator's judgment deems best. A distinct "step" or shoulder against both buccal and lingual walls is always made, serving a twofold purpose: First, as a retention; second, as anchorage for the amalgam near the dento-enamel junction, which will reduce the flow to the minimum. The clinician never uses posts as anchorage for amalgam. If the bulk of the material is sufficient, the seat flat and broad, and the walls are square with a very slight undercut, the crown will "stay put," as the margins will be much more perfect than they could be made either with an inlay or a crown. If each step of the operation has been carried out with due care, the margins will remain perfect.

The most difficult part of making amalgam crowns is the placing of a well-fitted and strong matrix. The Ivory matrix No. 8 usually suffices for this, but one's ingenuity should be used. In very deep gingival cavities, it sometimes becomes necessary to solder a matrix for this purpose. In these extensive restorations it is usually best to leave the matrix on for several minutes, until the filling is well hardened.

The clinician also showed a so-called split matrix, which is most useful for

approximal cavities. About 34-gage copper is well annealed and a strip cut off about one-third wider than the gingivo-occlusal diameter of the cavity. This strip is placed about the tooth in the desired position, and allowed to encircle the tooth as far as it will without inconvenience; the desired length is marked, also the point where the contact point should come to lie. It is then removed and cut off at the desired length, and with the rubber-dam punch a hole is made where the contact point should come to lie. The matrix is then slit from the occlusal edge down to this hole. With pliers little ears are turned up at the gingival angles so as to engage the ligature, the matrix is placed on the tooth and tied correctly. The flat floss used in prophylactic work is very convenient for trying this matrix, but ordinary dental floss will do. The ligature is placed once about the tooth and matrix, and a single knot is tied; then one end of the ligature is wound about the tooth so that it surrounds the tooth twice, but with only a single tie. The ligature should be held taut with one hand while with an instrument it is adjusted about the tooth and matrix and carried up above the gingival margin. If the opening for the contact is not in the proper place, it may be adjusted by drawing either end of the ligature. The ligature is then tied with a surgeon's knot, and wrapped about the tooth, tying mesially and distally, until the form of the interproximal space is produced as desired. After the first tying, the matrix should not be made too tight, but left so that some amalgam will be forced over the margins, for it will be found almost impossible to carry amalgam perfectly to the margins, if a small excess is not permitted.

In placing the filling, pluggers that will fit into the angles of the cavity are used to start with, and a quantity of the filling material is carried to place. The amalgam is condensed with great force, so that it will be spread tightly against and over the margins. The use of very heavy mallet force is expedient for condensing amalgam, the jar from the blow producing a greater density than it is possible to obtain with manual force. As large pluggers are used as can be manipulated in the cavity, thereby avoiding chopping, and condensing the material to a solid mass. A large excess of amalgam should be placed over the cavity and firmly malleted down with a plugger, sufficiently large to more than cover all margins. This will draw any excess of mercury to the surface and away from the margins, where the greatest strength is desired. Any such excess should be removed and replaced with dry amalgam, until no excess of mercury is obtainable. Since amalgam is a plastic mass, pressure at one point tends to produce movements at all other points, which means that the only tight margin will be where the pressure was last applied. The only way to avoid this is by having a sufficient mass of amalgam to cover all margins, producing pressure simultaneously at all points. Amalgam is a congealing metal, and the tendency in any crystallizing mass is to dip at the center and round at the angles. This tendency is reduced to the minimum in accurately balanced alloys, but even in these it is present to a small extent, and the only means to overcome it consists in placing an excess that can be removed after a few minutes, or as soon as the first shrinkage in the setting mass has taken place, which period should not exceed from three to five minutes.

As soon as the amalgam is resistant and can be carved, the excess should be carved away with suitable instruments, the ligatures cut and removed. One end of the matrix is grasped with heavy pliers; while holding the opposite end firmly against the tooth, the matrix is torn a short distance from the contact toward the gingival margin, and removed. The other section can be readily removed. With this form of matrix, no space is lost by the thickness of the metal, and there is no occasion for disturbing the filling in its removal. It can be quickly and accurately applied, and when separation is desired, a separator can be placed over it.

By repeated experiments with the dynamometer the clinician has found

that the greatest strength of amalgam can be obtained by thorough amalgamation, then expressing all excess mercury, and condensing the filling with heavy mallet force. The adaptation also is much improved by employing heavy force in condensing the material.

Careful tests made by the clinician with several mixtures of alloys with more or less mercury show a loss of strength of about thirty per cent. in "wet" mixtures as compared with the same amalgam when worked "dry."

The clinician exhibited and explained a new amalgam micrometer of his own design, and an amalgam dynamometer.

Crown and Bridge Work.

PROPHYLACTIC CROWNS AND BRIDGE ABUTMENTS. (By Dr. A. E. SCHNEIDER, Chicago, Ill.)

The clinician demonstrated prophylactic crowns and bridge abutments, showing what he considers to be the only two true prophylactic crowns that we have in dentistry today. There is absolutely no metal outside of the peripheral contour of the tooth or root, which means that it is absolutely impossible for food to accumulate at the junction of root and crown. This is accomplished by the principal step in the preparation of either crown—the inset shoulder, which is prepared with a plain fissure bur. This allows for a finishing of whatever material is used through a perfect butt joint of tooth and material.

The clinician first demonstrated a root prepared as any root might be prepared for a dowel crown, except that the shoulder was cut into the root to allow for a banded root and, at the same time, a smooth union of the tooth and material. By using, in this case, a Goslee tooth, one is able to make a bridge abutment much more satisfactorily than with other methods.

The second crown demonstrated was a porcelain jacket crown, which allows of imitation of natural color, contour and general characteristics in every individual case. This crown can be used also as an abutment for all-porcelain bridges without metal construction, and it has been found to be of great durability. The operator must be particularly careful as to just where to place an all-porcelain bridge, so as not to have the bite too close. The principal requisite in all-porcelain bridges is a perfect occlusion; other conditions being normal, one need not worry as to the longevity of the bridge.

VARIOUS METHODS IN MAKING A GOLD BASE FOR A PORCELAIN CROWN WITH AND WITHOUT CASTING. METHOD OF MAKING A GOLD BASE WITHOUT CASTING. (By Dr. CHARLES P. GROSBY, St. Louis, Mo.)

The clinician showed a method of making a gold base without casting, the preparation of which consists in grinding the root both labially and lingually from a central point where a step cavity is formed, so that the finished gold base will straddle the exposed end, thus overcoming any tendency of rotation or displacement of the crown.

The labial bevel should usually extend from the lingual edge of the canal to a point sufficiently beneath the gum to allow for the thickness of the gold base.

The lingual bevel should not extend quite to the gum line, because of the absence of esthetic requirements upon this surface. When the preparation of the root is completed, and the porcelain crown adjusted properly to the root, the base is then ready to be made.

A 14- or 15-gage iridio-platinum bar is fitted to the enlarged canal, which has been previously enlarged to receive the dowel. A disk of .001 platinum foil is burnished to the prepared cavity, and the dowel placed in position. Soft gold is then packed into the matrix around the dowel and burnished to a close adaptation to the base of the root. This should then be removed and held in a pair of soldering pliers, and pure 22-karat solder used and sweated into the gold foil. This base should then be returned to the root, burnished, and removed, and more gold solder added until it is flush with the root.

The selected porcelain crown should then be treated likewise; after platinum foil has been burnished into the crown

and an iridio-platinum post of 14 or 15 gage placed in position, pure gold foil is packed into the matrix and around the dowel and burnished to close adaptation. This is then removed, and 22-karat solder is flowed into the foil. This is then replaced upon the base of the crown, after the latter has been properly ground to fit to the root. When the base for the root and the crown is completed, both are ground and fitted together. They are then waxed together in the mouth, removed, invested, and soldered.

The clinician also demonstrated the casting process of a gold base by using .001 platinum foil matrix burnished over the prepared base of the root and a 14-gage iridio-platinum dowel forced through the matrix into the enlarged canal that has previously been prepared. Inlay wax is pressed into the matrix and around the dowel, and burnished to close adaptation to the root base. It is then removed and cast. The same method can be applied to the porcelain crown, the procedure being the same as has been previously described.

It was also demonstrated how a badly decayed root with a canal opening enlarged by caries can be saved and rendered useful. As a rule it is advised to extract such roots, but by the following method they may be made useful so as to last for a number of years.

After the root has been properly prepared and treated, and all carious matter removed, the apex is filled. A porcelain crown is adapted closely to the labial part of the root and removed. A 14-gage iridio-platinum post, cut to proper length and having been tried to the root with the crown in position, is then cemented to the root at the apex with a very little amount of cement, which is allowed to set. The porcelain crown is then placed in position so as to assure the exact position of the post. The crown is then removed, and amalgam is packed into the root-canal and around the post gently but firmly, and when the amalgam is flush with the surface of the root, the porcelain crown is placed in position and gently forced to proper adaptation to the root. The excess mercury and amalgam is wiped away, the crown again pressed in position and lightly malleted to place, and whatever excess amalgam there may be is again wiped away, the crown is gently removed and the amalgam allowed to set.

The porcelain crown should then be permanently attached with cement. The advantages claimed for this method are the protection afforded to the end of the root by the amalgam; accuracy of adaptation between the crown and root, which is facilitated by manipulation while the amalgam is in a plastic form; absence of stress on the broken root, which would be present if a very heavy gold casting were cemented to the root, the weight of which might consequently crack the root. The clinician has inserted this kind of crown in the mouths of patients for several years with lasting good results.

(I) The Use of Plain Teeth in the Construction of a Porcelain Denture on Platinum Base. (II) Porcelain Gum Restoration in Removable Bridge Work. (III) Combination Cast Denture of Porcelain and Rubber Attachment. (By E. B. Ducasse, New Orleans, La.)

The clinician explained his method of constructing a porcelain denture on a platinum base, whereby the time necessary for construction, the weight of the plate, and the intricacy of the work are minimized.

After the base has been struck up in the usual manner, a platinum wire of about 16 gage is soldered along the labial and buccal periphery, extending to the tuberosities, but not bringing the wire around the lingual surface, as is customary in a gold base. Five lugs of platinum are soldered on the base for the attachment of the porcelain, using platinum solder and the oxyhydrogen blowpipe. The teeth are then set in proper alinement and articulated, the proper contour and fulness are obtained in wax, and the work is tried in the mouth.

Instead of continuous-gum teeth, ordinary plain teeth are used, roughing or

stoning every surface that will come in contact with the porcelain.

The next step consists in passing a platinum wire of about 23 gage through a lug on one side to one on the opposite side, thus forming a temporary attachment to hold the platinum base in its proper position in the investment. The teeth are held in the investment by their pins, Standard investment being used.

After the boiling-out of the wax, the case should be heated slowly and brought to a high heat in order to remove all particles of wax and residue. At first the teeth will be noticed to turn dark, owing to the burning of foreign matter. Upon cooling, porcelain is immediately packed along the buccal and labial aspects. Since the shrinkage of porcelain is most perplexing and its contraction must be overcome, a form of concrete composed of equal parts of granulated porcelain, which fuses at 2600° F., and S. S. White's highest fusing body, is employed.

By using this mixture shrinkage is overcome to a vast degree. The work is then set into the furnace, and fired.

The case should be allowed to remain in the furnace until it is well cooled, which requires approximately two and one-half hours. When the case is cool, the investment and wire attachment are removed, since they have fulfilled their purpose, and the lingual surface is treated in the same manner as the buccal and labial. A mixture of gum enamel is then placed where needed. The case is then ready to receive its second firing. Many firings are required if fissures and porosity exist.

(II) In a case where much absorption has taken place owing to traumatism or to a pathological condition, and where the lip is short, the use of long facings renders the work unsightly. To make an esthetic bridge, the clinician suggested the use of dummies of the same size as the lost teeth, and restoration of the soft tissues in porcelain. His method of procedure is as follows:

The abutments are removable, consisting of a spring or clamp which holds them firmly in position. These clamps are reinforced by a lug, which takes up the stress of mastication and prehension. The clamps work in a cone-shaped tube of iridio-platinum plate, which is cemented in the roots.

Dummies are placed and waxed in their relative positions, removed, and invested. After boiling out the wax, a slot of iridio-platinum of 36 gage is placed around or over the pins, and soldered with platinum solder.

The skeleton or frame thus formed is placed on the cast, and wax is used to take up the absorption. It is then removed, and the lingual surface is treated with platinum foil. After investing again, the wax is removed, and porcelain is added and fired.

The dummies now become a gum section as it were.

The next step consists in removing the platinum foil, and a cast backing is made. This backing or cast is soldered to the abutments, and the gum section is then cemented to place.

(III) After the base has been cast or swaged as for a metal denture with vulcanite attachment, the following *modus operandi* is adopted:

The teeth having been properly set up, a wire is applied from one second bicuspid to the other, so that the labial and buccal sections can be readily removed without distortion and treated as follows:

Platinum foil is burnished on the lingual surface and tacked, and the case invested. After boiling out the wax, the porcelain is built up and fired, giving a gum section of ten teeth. This section is placed on the base and vulcanized in the usual manner, the molars having been vulcanized previously.

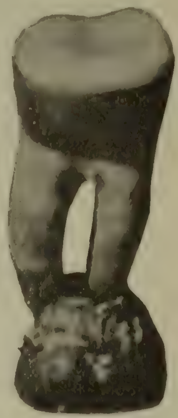
Coloring Porcelain. (By Dr. E. E. Haverstick, St. Louis, Mo.)

The clinician demonstrated his methods of changing the color of porcelain teeth by applying to their surface a moderately high fusing porcelain enamel, mixed with mineral stains and distilled water, and of coloring by mineral stains mixed with oil, which is the less desirable procedure. He also demon-

strated porcelain inlays for anterior teeth from which the gums have badly receded, and which have large cavities. Porcelain is built in the upper portion of the inlays as to somewhat resemble the shape of the gum, and this portion is colored pink to match the color of the gum.

Porcelain Jacket Crowns. (By Dr. C. W. Work, Ottumwa, Iowa.)

The clinician demonstrated his method of restoring badly broken molars and bicuspids by the use of porcelain in the occlusal surface to avoid the exhibition of too much gold. First a band of 22-karat gold plate is soldered with 22-karat solder, measuring half the length of the crown of the tooth to be restored. A partition is then placed in the band at the top of the root, and the occlusal surface is restored by baking-in Jenkins' prosthetic porcelain. The accompany-



ing illustration shows the completed crown in position.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

Fifteenth Annual Meeting, held at Old Point Comfort, Va., July 22, 23, and 24, 1913.

The fifteenth annual meeting of the Southern Branch of the National Dental Association was called to order in the ballroom of the Chamberlin Hotel, Old Point Comfort, Va., at 11.30 o'clock Tuesday morning, July 22d, by the president, Dr. S. W. Foster, Atlanta, Ga.

The meeting was opened with prayer by the Rev. J. T. McGlothlin, Hampton, Va.

The first item on the program was the address of welcome on behalf of Virginia, by Dr. Geo. F. Keesee, Richmond, Va., which was followed by an address by Dr. W. H. Ewald, Norfolk, Va., conveying the welcome from the State Dental Society.

Dr. B. Holly Smith, Baltimore, Md., responded to the address of welcome on behalf of the association.

The next item on the program was the address of the President. Dr. V. E. Turner occupied the chair while the president, Dr. S. W. Foster, Atlanta, Ga., read his annual address.

On motion of Dr. B. Holly Smith that a committee of three be appointed to report on the President's address, the chair appointed the following gentlemen: Dr. B. Holly Smith, Dr. T. T. Moore, and Dr. R. W. Carroll.

The President then resumed the chair.

Dr. Turner, chairman of the Executive Committee, then offered the program for the next session.

The meeting then adjourned until the afternoon session.

TUESDAY—*Afternoon Session.*

The meeting was called to order Tuesday afternoon at 3 o'clock by the president, Dr. Foster.

The first order of business for the afternoon session was the reading of a paper by Dr. J. A. CAMERON HOGGAN, Richmond, Va., entitled "Nasal Space and the Dentist's Responsibility."

[This paper is printed in full at page 275 of the present issue of the COSMOS.]

Discussion.

Dr. PEARSON. I appreciate the amount of work which Dr. Hoggan has done in the preparation of the model he has shown us. This is a subject worthy of thought in every case that we are called upon to treat. Of course we know that all bone grows by stimulation, and we should produce only normal stimulation. We know that one of the first organs to be formed is the tongue, and the cranium is formed around that. Dr. Cryer has laid great stress on the part which the tongue plays in the development of the arch of the mouth. I had the pleasure last year of hearing him speak on the subject of broadening the arch and trying to separate the suture, which he pronounced to be absolutely impossible. A great deal is being said on this subject at the present time, but I think Dr. Cryer has proved that it is impossible, and at a clinic in Philadelphia he showed skulls to prove his contention. Of course, when an examination is made by X-ray photographs there seems to be an opening there, but he showed a number of X rays made in such cases thus treated which showed no separation at all. As Dr. Hoggan said, the way in which the breathing space is increased is by the lowering of the palatal arch. That naturally straightens the septum, and the breathing space is only so much in proportion to the arch. If the arch is normal, the breathing space is bound to be normal.

Dr. C. L. ALEXANDER, Charlotte, N. C. I would like to ask the essayist whether he thinks that often the extraction of the first molars causes a deflection of the septum. A patient of mine in whom the molars were extracted recently had some trouble with breathing, and had to have an operation performed; the septum was taken out in order to secure breathing space, and I feel confident that the extraction of the first molars was the cause of this patient's trouble.

Dr. M. D. HUFF, Atlanta, Ga. I have been very much interested in the lecture and in the model, which were both perfect.

I have seen the breathing-space increased by the application of plates or suture-openers, so called, in the regulation of teeth, and I know it is possible to increase the space in the nares, because it is being done all the time, and that it is one of the best services we can render a suffering public. The essayist is to be commended for his work.

Dr. I. N. CARR, Durham, N. C. When discussing the subject of what constitutes an absolutely normal face, and the bones that form the bony frame of the face, most of us, having forgotten a great deal of anatomy, cannot do justice to the subject. But we all approve of practical orthodontia. We know that, by pressure, absorption of bone or any other tissue is produced, and it has always been a question in my mind whether or not it is always practical to expand the arch in regulating teeth; I doubt it very seriously myself. I know that in some cases it is practical, but probably not in others. Extraction of teeth, in my opinion, will often save a child a great deal of nervous strain, and the operator a great deal of trouble and annoyance, and in many cases, therefore, is a more practical way of regulating teeth. If the arch does not develop with sufficient rapidity to accommodate the number of teeth, then we must make room for them in some way, rather than sacrifice the child's nervous system under the continuous strain of gradually applied pressure. I believe it is often a mistake not to extract the first bicuspid, for instance,

when all the other teeth are in perfect occlusion. I know that many orthodontists disagree with me, thinking that teeth should never be extracted. I think they are carrying a principle too far. When the lower jaw is so broad as to fail in occlusion with the upper teeth, the upper jaw should be expanded to accommodate the lower, thereby producing perfect occlusion of all the teeth. This, to my mind, is more important than changing the facial expression, since utility and comfort go before esthetic appearance.

Dr. J. S. Spurgeon, Hillsboro, N. C. I did not expect to speak on this subject, but I must rise to express my disapproval of what Dr. Carr has said in regard to extracting teeth. But before doing so I wish to express my commendation and appreciation of this splendid model and the lucid description that Dr. Hoggan has given of it.

This model shows beautifully the construction of the bones, also that a little pressure exerted at the right time and in the right direction will not only move the teeth, but will change the whole arch so as to produce a normal contour of the face. The occlusion will become a natural one, seemingly without effort.

The essayist has shown clearly and beautifully how the laws governing the development of the face may be assisted by a little timely interference.

One of the greatest mistakes made by many of us who are only doing a little in orthodontia and who have not availed ourselves of the latest and most valuable methods, is that we use too much pressure and very often do not apply it in the right direction. With a little pressure in the right direction, the occlusion will become normal, the arch will expand, and the face will change accordingly, assuring its proper contour.

This model shows clearly and plainly how these results are accomplished if we can only inaugurate treatment at the right time and in the right way, and use the proper amount of pressure.

The orthodontists, whom Dr. Hoggan "represents," deserve the greatest honor and our unstinted support for their deep insight into the laws of nature as applied to the development of the bones of the face.

I believe that the time is coming and is not far distant when we shall know the laws of nature as applied to our whole physical being so well that sickness and pain will be a thing of the past. Why should a man be sick, if all the organs and glands of the body are performing their proper functions? Why should we have auto-intoxication, if all the glands are giving off the proper amount of secretions? Why should they not always produce the proper amount of secretion? There seems to be but one reason; that is, they have been overtaxed, either from the amount or the quality of the work they have had to do, and this was caused either by the quantity or quality of the food or the drinks ingested.

The time is coming when we shall know our physical organization so well that violating it will mean admitting our ignorance and wilful disobedience, and acknowledging that we are sick will be a reflection on our intelligence.

In regard to Dr. Carr's remarks, I would say that those of us who have gone over the principles of orthodontia as laid down by those two eminent teachers, Angle and Jackson, should not admit that teeth should be extracted for the correction of irregularities. There may be one case in a thousand when a bicuspid or first molar should be extracted—though even then I would not do it: "The normal development and contour of the face require that all the teeth should be left in the arch."

The trouble with many of us is that, when we think that teeth should be extracted, we do not take into consideration the age of the patient and the size of the teeth, and forget that the teeth are as large as they will ever be, and that the face will continue to develop and grow for several years. We do not allow our imagination to run far enough ahead to the conditions which will prevail when the child is fully grown. At the age when children are usually brought to us, the face is not nearly so large as it will be, therefore it looks as though there were a protrusion which

could not be overcome without the extraction of one or more teeth, and yet, if we will wait a few years, the face will shape up properly, and we will realize what a mistake it would have been to have removed any of the teeth.

When Dr. Carr, Dr. Alexander, myself, and many others present were in college, the straightening of teeth, as it was then called, was simply a matter of individuality. We were taught the manner of construction of some kind of appliance for the correction of a particular case, losing sight of the principles involved. At that time we thought we were justified in removing one or more teeth, as long as we could facilitate the straightening process; but time has proved what a great mistake we made. In every case where I have extracted teeth for the correction of an irregularity it became evident later that I had made a mistake.

Some years ago, in 1905, at our state society meeting, Dr. J. A. Gorman of New Orleans, and myself, presented papers on orthodontia, he taking the position that no teeth should be extracted, and I the opposite. I presented a number of models and photographs of cases where I had removed the first bicuspids, and had succeeded in getting good occlusion, the features of the face seeming perfect. It appeared quite certain that I had accomplished all that could be desired, and in a much easier way than if I had preserved all the teeth and had expanded the arch.

I thought I had proved conclusively to everybody present that I was right, and Dr. Gorman was wrong; but I did not take into consideration that these patients were children. I did not see what was going to happen in the next few years.

In less than two years, as the faces of these children developed, it became more and more clear that I had made a mistake. So I wrote Dr. Gorman a letter of apology and commendation for the lesson which he had forced upon me, and that lesson to me has been worth more than all the books I had read on the subject up to that time.

At the time these models and photographs were made, the children were from ten to fifteen years of age, their occlusions and facial contours were good, and appearances were all that could be desired. Now it pains me to look at them; the maxilla has failed to develop, the chin falls in, and the faces, otherwise beautiful, are disfigured for life. Dr. Alexander can bear me out in what I say, and perhaps feels the results of these mistakes as keenly as I do.

I therefore would impress on this audience not to extract teeth in children thinking that any benefit will be derived from such extraction in the correction of irregularities.

Dr. S. W. Foster, Atlanta, Ga. I do not want to let this subject pass without giving my expression of appreciation of the matter presented by Dr. Hoggan. In my address this morning I made the statement that within the last few years the science of orthodontia has had a decided influence upon certain forms of biology and physiology of the human family, and the presentation of this model most clearly carries out that suggestion.

Two of the greatest subjects today are orthodontia and oral hygiene. These two subjects have a most important bearing upon the physical and mental development of the human individual. The influence of the proper development of the jaws and nasal passages upon the growing child, as the essayist has pointed out, is most wonderful. What is the effect of closing the middle meati, as the essayist suggested? It means reflex pressure of carbon dioxid upon the lungs and the permeation of this gas throughout the system, causing debility and a lack of proper development. These effects are manifested in many ways. As an illustration I would like to cite an incident that occurred a few weeks ago, when with a distinguished diagnostician I was attending a theater. A number of ballet girls were singing, with their backs turned to the audience; one of these girls had drooped shoulders and an improperly developed spinal column, which I would not have noticed, however. The diagnostician said to me, "When that woman turns around, you

will find that she has malocclusion of the jaws, because she has improper development of the thoracic cavity, and her shoulder and spinal column indicate that she has not had sufficient breathing-space to receive proper development." When she turned around, she presented a V-shaped arch, which this gentleman had diagnosed from looking at her back.

I want to impress upon you today the fact that the dental profession as a whole is not as studious and as progressive as it should be. Not that we can all be orthodontists in the full sense of the word, but every one of us should be able to recognize lack of proper physical development and the conditions associated with underdevelopment of the arches and nasal passages, and to direct our *clientèle* into the proper channels. The orthodontia specialist has not been duly considered in the past, but he is coming into his own, and the dental profession and the public are beginning to realize that a maloccluded mouth means a lack of proper nutrition, oxygenation, and development. The reason why more of us have not succeeded in orthodontia is that we have been unable to obtain satisfactory results and collect proper fees, because we have failed to educate the public as to the importance of this department of our profession.

Dr. HOGGAN (closing the discussion). I assure you that I appreciate very much your words of commendation.

In regard to the question of extraction, I think this matter can be best disposed of by placing it in the hands of a committee who may thresh it out among themselves.

But there is something about beauty that is more than skin deep. It means that every line and every structure must be in harmony with the body. There may be proper development of the upper portion of the face, and still that face be entirely disproportionate, owing to the extraction of several teeth. Extraction of the molars shortens the face and alters the size of the inferior meati, because the internal nose is as large as the teeth make it. If teeth are extracted here and there, the size of the jaws is decreased. How many persons' lives are ruined by the consciousness that they are really not as presentable in appearance as some others. Everyone takes a certain pride in the fact that they are normal, presentable, or even good-looking, and some people take exceeding pride in the fact that they are handsome. We have no right to interfere with the conscious enjoyment which a man or woman takes in being normally developed. We are therefore unquestionably assuming too much responsibility in extracting teeth, unless it must be done to relieve pain. I assure Dr. Carr that the movement of teeth must be more or less a physiological process, and that it is without the tedium and pain he speaks of, if carried out correctly. I have many patients in whose mouths orthodontia work has been done without causing the least pain, because the right amount of pressure has been applied at the right time.

Motion was made and carried to adjourn until the evening session.

TUESDAY—*Evening Session.*

The meeting was called to order at 8.30 o'clock by the president, Dr. Foster.

The first order of business for the evening session was the report of the Committee on Oral Hygiene, by the chairman, Dr. ROBIN ADAIR, Atlanta, Ga., as follows:

Report of Oral Hygiene Committee.

It is with pleasure that the chairman of your Committee on Oral Hygiene reports an increased interest in the subject of hygiene, prophylaxis, and pyorrhea work.

The colleges are nearly all giving a course of lectures on these subjects. The dentists themselves are doing a large amount of educational work along these lines, by talks at the chair and public lectures before schools and clubs. Various corporations have seen the great advantage of clean mouths in operatives, and the best of all is that the people themselves are awakened to the importance of the subject.

Your chairman has been engaged in active correspondence with many of the dentists most active in this work, for the purpose of collecting material for a book on the sub-

ject, and all of these letters have a tone of satisfaction as to the progress being made in preventive dentistry.

Instead of securing a great number of papers and clinics, your chairman has followed the advanced method of association work, and has secured a man whom he knew to be competent to write a worthy paper for the society. He is here for work also, and I want to have him give several clinics. He has brought with him material for that purpose.

The paper that I shall now read is part of a manuscript for a book on this subject.

[Dr. Adair then read a paper which he stated was the first chapter of his forthcoming book on the subject of "Prophylaxis and Pyorrhea."]

The next order of business was the reading of a paper by Dr. F. H. Skinner, Chicago, Ill., entitled "The Prevention of Pyorrhea and Dental Caries by Oral Prophylaxis."

[This paper is printed in full at page 299 of the present issue of the Cosmos.]

Discussion.

Dr. I. N. Carr, Durham, N. C. There is no subject nearer to my heart than that of oral prophylaxis. I have taken a deep interest in this subject for a number of years; still more so since my connection with the National Hygiene Association. The paper we have listened to is not discussable; it is absolutely perfect in all its pronouncements, and the truths enunciated therein cannot be gainsaid.

With one statement in particular I heartily agree, viz, that an absolutely clean tooth will not decay. I do not agree, however, with the statement that erosion is caused by undue brushing with the tooth-brush. It occurred to me, when the essayist made that statement, that he was confusing mechanical abrasion with chemical erosion. Most of us have seen many cases of abrasion caused by the tooth-brush. I know of the case of a man who brushed his teeth in the old-fashioned way to such an extent and with such a stiff brush that he actually brushed the enamel from the peripheral margin and cut into the tooth an eighth of an inch, so that the pulp could be seen through the dentin. This is mechanical abrasion, but erosion, such as I think the essayist was describing, I look upon as being due to chemical action. Mechanically *abraded* teeth are always smooth and polished, while chemically eroded teeth are not smooth or polished, but more or less pitted. This we used to attribute to the action of acid on the calcium salts of the tooth.

I do not believe that it is a good plan to put any highly abrasive substance in the hands of our patients for brushing the teeth.

The essayist failed to mention the rinsing of the mouth by the patient. Rinsing the mouth does not mean simply filling the mouth with water, turning it around and ejecting it. By rinsing I mean making a bellows of the cheeks and gums, and forcing the water through the interstices of the teeth, this force being almost fifty pounds of air pressure. If a patient had never heard of a toothbrush and would rinse the mouth thoroughly after each meal, the chances for caries of his teeth would be small.

Dr. Evans. I would like to ask Dr. Skinner to tell us what his criterion is for hopeless cases.

Dr. Skinner. Are you speaking of pyorrhea or caries?

Dr. Evans. You speak of eliminating all hopeless conditions. What do you consider as absolutely hopeless conditions?

I would also like to ask whether any suggestion has ever been made of danger resulting from acids forming from soap, if the mouth is not sufficiently well rinsed.

Dr. Robin Adair, Atlanta, Ga. In answer to the suggestion that Dr. Skinner in this paper had covered the whole field, I would say that in my opinion he has hardly scratched the surface of this subject. It is impossible for him to cover the whole ground in one paper. His method of treatment consists in giving closest attention to the many details, and I am sure that, if you would read his other writings on this subject, you would be as much benefited as you have been by this paper.

Dr. Parcher. There is one question with regard to oral prophylaxis that I have been asked hundreds of times, and I want to ask it here. How do we get our patients interested? I know something of Dr. Adair's method, but I wish he would state how he selects his patients, and what standards he uses for interesting his patients in the work.

Dr. Skinner. Dr. Carr spoke of erosion, when the surfaces are smooth, as mechanical abrasion, and of roughened surfaces as chemical abrasion. In all the books I have studied, true erosion is described as a smooth, polished surface. If a tooth is broken down by acid fermentation resulting from débris left on the tooth, there will be a rough surface, but I never have heard that form of tooth destruction classed as erosion. The point which I intended to bring out in the paper with reference to erosion was that, when an abrasive is indicated, I polish the teeth with XXX silex and tin oxid in order to produce a brilliant polish, and then have the patients use the cotton rolls and wooden points alone, but no abrasive, and theirs are the healthiest mouths.

Thorough rinsing of the mouth with water, as described by Dr. Carr, is a very valuable adjunct to oral cleanliness, and should be practiced immediately after meals. If we wait until food products have become practically glued to the teeth by bacterial action, the rinsing will not do so much good, but if done immediately it takes off nearly as much as the brush does, and cannot injure either gums or teeth.

One gentleman asked how to differentiate, in pyorrhea cases, between teeth that can and those that cannot be saved. The X ray furnishes practically the only positive diagnosis of how much bone remains, and whether the linea dura is not entirely gone. If the linea dura is gone, the tooth cannot be saved. A tooth which has much up-and-down motion is usually hopeless, but undue stress and malocclusion will sometimes produce this churning effect in teeth in which the X ray shows vital pulps and good attachment around the apex of the root, and the linea dura not entirely destroyed. By grinding these teeth to relieve undue pressure, or by pressing them into the alveolus, they can frequently be saved. If absorption of the root has started, or there are deposits on the apex, and the linea dura is entirely gone, we had better cure the pyorrhea around that tooth with the forceps.

I believe that soap or any saponaceous substance used in connection with the tooth-brush is suitable, as it lubricates the bristles so that they do not cut the gums or teeth so badly. Dr. James recommends Ivory soap and a smooth tooth-brush for massaging the gums. I believe, however, that cotton rolls produce better results than the tooth-brush in massaging the tissues.

Dr. Adair spoke of the paper as only touching the surface of oral prophylaxis. That is true. The more you become interested in prophylaxis, the more you can say on it, which is in line with the question of how to start this work: I do not know of any more convincing way than to have some good operator take care of your mouth, put it in a healthy condition, and maintain it in a prophylactic condition for six months. That will make anyone enthusiastic on the subject of oral hygiene.

With regard to the use of the disclosing solution in connection with oral prophylaxis, it is surprising to intelligent patients to see how easily filth deposits on the teeth can be discovered by its use. It usually embarrasses people to see how much dirt the disclosing solution shows on their teeth, and it makes them realize the necessity of oral hygiene, and, as the dentist becomes interested, he will naturally impress these feelings upon his patients.

Keeping the teeth and the alveolar process in a healthy condition involves a very grave responsibility. Articles written by Dr. Hunter and others have placed a great deal of our mechanical skill in a bad light. We know that devitalized teeth and large fixed bridges are, as a rule, a menace to health; also that the loss of a tooth spoils the entire side of the mouth, as far as perfect mastication goes, and that imperfect mastication and insalivation of food means

loss of food value, indigestion, and ill health.

A dentist must have a thorough realization of the value of a good set of teeth; he must master a short, concise method of imparting that knowledge to a patient, and lastly, possess the ability to make good in his work.

Dr. Carr. I think Dr. Skinner misunderstood me. I stand by the statement that there is a vast difference between mechanical abrasion and chemical erosion, and that in chemical erosion, the tooth surface is never smooth as in mechanical abrasion. The text-books of Tomes, Garretson, Kirk, and others distinguish between chemical and mechanical erosion, and I believe Dr. Skinner is confounding my idea with caries of the teeth, and not with chemical erosion *per se*. An eroded surface, as you all know, is a surface that has been acted upon chemically; an abraded surface is one that has been acted upon mechanically.

Dr. Adair. I think Dr. Skinner has answered very satisfactorily Dr. Parcher's question when he speaks of the dentist himself becoming interested in oral hygiene. That is the whole thing, and a paper could very well be written on that subject.

The way in which I do this work is almost compulsory. In the first place I will not do dental work in the mouth of a patient until his teeth have first been cleaned by the dental nurse. When this is done, the patients are instructed to buy a tooth-brush, and are then taught by the nurse how to use it. Then they become interested and begin to ask questions as to what they must do to keep their mouths in this condition, because the teeth look so nice, and the mouth feels so well. Let them make an opening of this kind, and then tell them that they can do that by taking the prophylaxis treatment every few months.

Dr. Campbell. Dr. Skinner made the statement that in one case where sugar had developed in the urine, the sugar disappeared after prophylactic treatment, and I wish he would tell us something of the relationship of the prophylactic treatment with the disappearance of the sugar.

Dr. Skinner. That was not stated in the paper, but in two cases of that kind the condition cleared up, which to me indicates the close relation between the alveolar process and the system. The alveolar process is a vascular, porous, spongy bone tissue when in a diseased condition. Septic matter is being constantly absorbed by the system from it, and this has a very important bearing on the systemic condition. We apparently can put the alveolar process in a healthy condition with the Dunlop vapor, and thereby stop absorption of septic matter. By stopping that breaking down of the process, we eliminate one of the means of tearing down the system. Diabetes is a breaking down of the vital organs of the system, of which it may attack one or another, supposedly the liver.

In the cases of diabetes I have treated, good results have followed prophylactic dental treatment.

The meeting then adjourned until Wednesday morning.

(To be continued.)

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-fifth Annual Meeting, Philadelphia, Pa., June 24 to 26, 1913.

(Continued from page 99.)

TUESDAY—*Afternoon Session.*

The afternoon session was called to order at 2 P. M., by the president, Dr. Kratzer.

The first order of business for the afternoon session was a lecture by Dr. WESTON A. PRICE, Cleveland, Ohio, entitled "Some Foundation Principles that Should be Observed for the Manipulation of Gold and for Making Extensive Dental and Facial Restorations."

After his lecture, Dr. Price addressed the society with regard to the work of the N. D. A. Committee on Scientific Foundation Fund, and solicited contributions to the fund.

The next order of business for the afternoon session was the reading of a paper by Dr. RUSSELL W. BUNTING, Ann Arbor, Mich., entitled "The Saliva and Dental Caries."

[This paper is printed in full at page 285 of the present issue of the COSMOS.]

Discussion.

Dr. EDWARD C. KIRK, Philadelphia. The hour is late, and the subject is an intricate one, difficult enough to comprehend even when we are fresh in the morning, but at this late hour to attempt to discuss in detail the technical aspects of it, I fear, would be adding the last straw.

I want to call attention to the one phase of the paper that pleases me most, and that is its suggestiveness. There is nothing dogmatic in the statements made by the essayist. The paper is helpful in the sense that he gives us a *résumé* of perhaps the most advanced thought on the causation of dental caries. There are one or two points in the paper that I should like to speak about in order to focus your attention upon their importance. The question of that fundamental test to which the essayist referred as being made in practically all cases of saliva investigation is the question of its reaction. We all know about dipping litmus paper into the salivary fluids to see whether the litmus is changed from red to blue or *vice versa,* and then recording the result, and the essayist has told us how uncertain and untrustworthy the litmus reaction is with regard to determining the fundamental question of the reaction of the saliva. It is important for us to know about the reaction of the saliva, because we must know the relation of the reaction to the carious process, as well as the ability of the salivary fluid to sustain certain types of bacterial life, etc. He has also spoken of the use of other substances as indicators for determining the reaction of the saliva. He has run over quite a number, some with easy and some with difficult chemical names, and we gather from his conclusions that they are all more or less defective. That is to say, they do not measure up to scientific requirements in the matter of delicacy and precision.

I want to call attention to an indicator that has helped me a great deal, and one which we can apply every time we look into the question of the salivary reaction. We can take a specimen of saliva, especially one which is more or less mucinous or of a thick, ropy character, put it in a test tube, and add the smallest quantity of any acid, acetic or lactic, and we will immediately note a precipitation, a viscid precipitation of some-

thing, and what is that? That is what we call coagulated mucin, that substance which, when in solution, gives the albuminous character to the saliva and is precipitated by acid, and which is a delicate reagent in itself. Mucin is only soluble in alkaline solutions, therefore any saliva that is mucinous or ropy is fundamentally alkaline in character, otherwise it would not hold the mucin in solution. Mucin itself is thus an indicator of alkalinity, that is, alkalinity from a chemical standpoint, and this very fact of the extreme delicacy of reaction between mucin and any acid in the mouth is an important factor in the study of the relationship of the composition of saliva to caries.

Now we come to the plaque. I have studied the plaque very carefully, and many studies have been made by others of its physical and biological aspects, and all sorts of bacteria have been dragged into this problem, in order to explain the observed production of some kind of gelatinous, glutinoid, gummy substance. The whole race of bacteria has been examined, and requisition has been made upon them for some form of bacterial organism that could be made responsible for the production of the gummy kind of exudate that characterizes plaque formation. A variety of bacteria produce a gelatinoid exudate, but it is a curious fact that the best-known of that class are not ordinarily those seen in the mouth. We have lactic-acid-producing bacteria, those which split up sugars, starches, etc., with the production of lactic acid as an end-product; now, if we have that class of infection in the mouth which is productive of the first stages of the caries process, and that going on in saliva which is mucinous, sufficiently alkaline to keep mucin in solution, *which* is the type of saliva characteristic of the caries susceptible? If, under these cirstances, we start fermentation at any point upon a tooth in a mouth which contains that kind of saliva, we immediately have a precipitation of mucin at that point, and the bacterial organisms become cemented to the tooth by a so-called plaque formation. I have no doubt that this condition which I have indicated is the basis of the most important part of plaque formation that we have under consideration.

There are one or two other things that I want to speak of. I always feel like putting up the semaphore or a danger signal when the dental profession gets hold of an axiom and runs away with it. It is one of the most dangerous things in the world to be dominated by an axiom, and to rest content in the feeling that we have settled the whole problem. We have an instance of that when somebody took the original statement of Black and crystallized it into the axiom "extension for prevention." The best answer I have heard to that was given by one of the practical critics of that axiom, who said that if we kept on extending, after a while we would have nothing to prevent. Black did not say "extension for prevention," but somebody thought it easy to misuse his idea in that form, and as a consequence a great many men have run away with the idea of extension for prevention without considering what it meant, without the limitations that Black placed upon it.

We are now running away with another axiom—viz, "Clean teeth do not decay." The essayist has truly said that the only way to keep a tooth clean is to take it out of the mouth and put it in a clean place. I should like him to explain, when he comes to close his discussion, what he means by clean and what he means by dirty. Somebody has said that dirt is matter out of place. Now, what is this matter out of place? What constitutes a dirty mouth or a clean mouth? I mean from a scientific, not from a sociological standpoint. The problem that is before us is, What is the nature of the material that goes to make an unclean mouth? From the earliest records that I can find in dental literature, we find it said that dental caries is caused by the adhering to the teeth of food particles, which, after a while, decompose and generate acidity, and this attacks the teeth and finally destroys them. That is recorded as far back as 1530, and I suppose before that time they had the idea that clean teeth would not decay. Some clean teeth, as

we know, do decay, and it is also true that some very dirty teeth do not decay. This brings me to the present attitude of the dental profession with regard to prophylaxis as the preventive of caries. Somebody said in regard to matrimony some years ago, when the question of whether or not marriage was a failure was under discussion, that—"Marriage might be a failure, but it was the best arrangement we had under the circumstances." We may say the same of modern prophylaxis, that it does not go far enough, but it is the best arrangement we have under the circumstances. There is something beyond that, at the basis of the trouble. We may let the patient do the best he can, we may do the best we can for the patient, and yet we cannot always arrest decay. Teeth will decay at the cervical margins of fillings—that is, my fillings, not yours! We have decay in new spots; so we cannot keep the teeth clean enough by any method we know, so as to prevent decay absolutely; yet once in a while it happens that by changes of environment, changes in food habit, or the passage of time, the individual becomes immune, and decay stops. There is a different appearance in the tissues of the mouth —you know how it looks when decay is arrested. What are these changes? The individual has not taken any more pains about his teeth; he is not any more prophylactic; he is not giving his teeth any better use—so there must be something back of it all, and it is from this field of salivary composition that we are looking for the answer to that inquiry. Miller, in his investigations, showed us that it was possible to produce caries artificially by the fermentation of carbohydrate food substances taken into the mouth by the individual. Now comes the question, Is it possible that there be some other source of food for the bacterial flora of the mouth? The suggestion comes from Michaels, from his study of the salivary composition, that something comes into the mouth by being dialyzed through the salivary glands. If that be true, then we find that we are dealing with a disease that is not purely local, but has a constitutional predisposition behind it. Is it in the metabolism, bodily nutrition, acidity, or what? I think we can hope to find the solution of this question through the kind of work that Dr. Bunting is doing.

His paper is to me the most encouraging I have heard recently. We must not forget that Dr. Chas. Mayo, a very prominent surgeon, said not long ago in Chicago, before a large dental audience, that the next great movement in preventive medicine would come from the dental side, and the only question in his mind was, Will the dental profession take the step? It must come from the dental profession, who are the keepers of the portal of entry of the human body; these men are destined to be the great prophylactists, the preventers of disease, the health guardians of that port.

I want to congratulate and thank Dr. Bunting for the paper he has presented to us.

Dr. J. C. Curry, Philadelphia. I wish to express regret that the essayist had not been able to arrive at some definite conclusions more satisfactory to himself. How discouraging it must be to have to confess after so much research work as is here indicated that—"We have to deal with an unstable and changeable fluid which seems to resist our endeavors at every turn."

Again, "Who can say he knows all the materials with which he is dealing in any given saliva?" and further, "So serious is this interference in chemical reactions that it is truly impossible to say with certainty that even the simplest reactions which we employ are trustworthy." I like his saying this so frankly; it shows an absolute honesty which is at variance with so many papers which are presented dogmatically, and which aim rather to prove an opinion than to invite investigation. Some papers are presented with such force and persistence that they suggest a story which is told of Mr. John Brown by his brother Bill: "When John was in doubt morally about a thing, he always prayed, and Bill said he was so powerful in prayer that he always brought the Lord around to his way of thinking."

Happily the essayist does not take so strong a position.

Since listening to such an array of highly scientific data in regard to the etiology of caries, I am more than ever glad of my orthodox creed as taught by the late Professor Flagg: The cause of caries is mechanico-chemico-vital. This may seem like a shotgun creed and rather universalistic, but after twenty-five years of clinical experience I still cling to it. We clinical men find that, though chemical reactions are "extremely variable," we are daily dealing with conditions which are stubborn and persistent.

The essayist refers to Dr. Black, and quotes him as saying—"The hardness or softness of a tooth has nothing whatever to do with its susceptibility to caries." I think we "clinical men the world over" still believe that it has, and I am glad to hear the essayist himself say that it may be possible for the structure of the tooth to enter into the question to a certain extent.

My understanding of Dr. Black's statement was that he found all teeth, both the so-called hard and soft teeth, to have practically the same chemical content, which is quite a different observation from saying that they are equally resistant. For instance, a chemist could take chemicals and build a synthetic product under favorable conditions which would perfectly fulfil the requirements for which it was intended, but the same chemist, with exactly the same elements, under unfavorable conditions, would fail miserably. In the same manner, a vital temperament with a suitable environment would produce a perfect disease-resisting organ, while a lymphatic temperament, given the same chemical constituents, would be unable to combine them in so satisfactory a manner, and thus the first or predisposing cause of caries would exist independently of any bacterial ferment whatever. Again the essayist speaks of "those few who believe in the mutability of the teeth." I am one of these few, and while the test tube and the chemical formula may not record a change in the condition, I think there are good reasons to believe that changes do occur. Why not? We know that the organism as a whole—that the body is constantly undergoing changes; what reason have we to doubt that the teeth change? Are not they just as much a part of the body as any other organ? Are they not subject to the same vicissitudes? do they not obtain their vitality from the same source? Histology shows us how wonderfully they are built from within the organisms, how early their development begins, and how delicate are the tissues which go into their construction; and what is more reasonable than to suppose that they are equally liable as the other organs to the laws of time and chance? The bones change, the arteries change, the tissues of the eye, the ear, all tissues change; how, then, can we reasonably deny the mutability of the teeth? Let us not base all our conclusions on the revelations of the test tube and the crucible, for, as the essayist says—"It is truly impossible to say with certainty that even the simplest reactions which we employ are trustworthy."

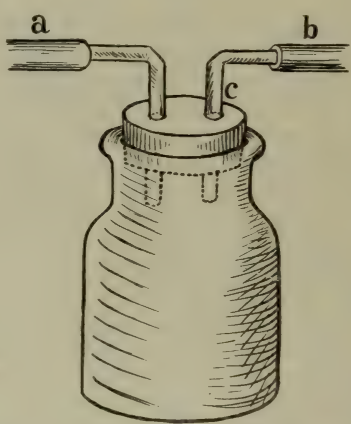
Finally, the essayist tells us that a mouth which is not self-cleansing cannot be kept clean with a tooth-brush. If a mouth is self-cleansing, why use a tooth-brush? And if it is not, it were a waste of time to try. *Ergo,* why brush the teeth at all?

Dr. J. J. Moffitt, Harrisburg. This is an interesting paper on an unworn topic, and one that is enlightening and elevating. My work in the field of salivary analysis has been quite limited, a condition which is apt to prevail with a man engaged in active practice, and has been largely selfish—that is, it has been done for the benefit of my practice. The study of saliva is the most important subject to us and to the public whom we serve, excepting the study of dietetics; but the various problems of dietetics can only be worked out when the problems of salivary analysis have been solved. To the practical dentist, it might seem that labors of this kind are time wasted, that working over test tubes, beakers, and burets is not worth the trouble involved. But when the time comes that he can send a salivary

specimen to a laboratory and get back a report showing the variations of that saliva from the normal, and then, turning to his dietetic charts, determine upon a course of diet and systemic treatment, he will be able to correct the conditions that promoted the caries while he is making his restorations, his fillings, crowns, and bridges, knowing that when his work is done, a recurrence of caries will not occur. This, of course, is an ideal condition, but it is the goal toward which our labors are directed. Hundreds of cases of Bright's disease are being detected in their incipient stage and prevented by similar laboratory tests. Though, as Dr. Bunting has said, we have not progressed very far in this work, there are unlimited possibilities, and anyone who wants to can help along in the good cause. I have arranged a saliva-collector which can be attached at any time to the saliva ejector, so that, whenever a case seems interesting, I can procure the saliva for study. The tests that I make are mostly those found in Hawk's "Practical Physiological Chemistry." Simple dietetic courses may, in this way, be worked out principally for the general health. But the moral effect on the patients is good, for when a patient comes into the office with a cavity to be filled, we know exactly what to do, and because of the surety of our manner, he submits himself to our advice and follows our directions. But when the case happens to be one of recession of the gums, of chemical erosion, of pyorrhea, or some abnormal salivary condition, our hesitation and display of uncertainty will make him unlikely to follow what few directions we are able to give him.

For procuring this saliva I use small, wide-necked bottles. In a cork which fits them all are two bent glass tubes projecting about an inch through this cork (see figure). The rubber tubing (a) to the saliva ejector is attached to one of the glass tubes, and a clean piece of rubber tubing (b)—renewed for each case—is fastened to the other glass tube (c) and goes to the mouth. In this way several specimens of saliva may be collected without interrupting the day's work, and the variations in their analyses may be compared with the varying conditions of the patients. Rubber dam should be used when there is any danger of having cuttings or drugs contaminate the saliva.

I want to ask Dr. Bunting if he made any tests with saliva incubated for twenty-four hours to determine whether, in each case, there was true fermentation, or sometimes decomposition of the specimen. Also whether one-half gram of the prepared bread would give an acid reaction, to any extent, if incubated



a, Tube to saliva ejector. b, Rubber tube to glass saliva tube in mouth—changed with each patient. c, Glass tube—to be changed with each patient.

under similar conditions for twenty-four hours in sterile water. I agree with Dr. Bunting that phenol-phthalein is the best indicator to employ in determining acidity of the saliva in connection with sodium hydroxid. I have always used a deci-normal solution instead of an one-hundredth normal solution, thus requiring 5 cc. of saliva for the test and multiplying the result by 2, in this manner getting the comparative acidity in terms of 1 as a unit.

Dr. Bunting, in confining himself principally to the question of the presence of carbohydrates and their effects upon the acid-producing bacteria, has given us some valuable tables, which will be a great help in comparative study. In

the first set of tables, Dr. Bunting successfully shows that ingested foods can greatly increase the acidity by fermentation. In the second set of tables, he concentrates the solids and mucin in his salivary specimen to show that, even in that form, the mucin cannot greatly increase the acidity. I do not know how Dr. Bunting collected his solids, but if he centrifuged the specimens and took them up with a pipet, or used a suction filter, he obtained considerable inorganic salts, which, while they would not necessarily affect the organic acids in the presence of the proteid substances, would very materially affect his indicator.

Further he has used, to promote acidity, bread, exceedingly high in carbohydrates and readily fermentable. Bread in reality forms a small part of ingested foods, and the periods of ingestion are intermittent. The carbohydrates in normal mucin form a very small part of the compound proteid, thus making the result for a small quantity of mucin appear exceedingly weak in food for acid-producing bacteria, while the supply in reality is constant. Toward the end of his paper, in leaving the question of the chemistry of the saliva and summoning the self-cleansing features of the mouth to aid in combating caries, he shows us forcibly what he said in the beginning of his paper, that our practical restorations are far in advance of our chemical analyses. What he says about retention places, improper tooth forms, and flat fillings interfering with the self-cleansing mechanism of the mouth is too sadly apparent in our everyday practice; but I would go farther back than that, and say that too few of us give the proper attention to the early regulation of the teeth at an age when it is possible to bring them into their natural positions and relations, thus neglecting an opportunity of facilitating the self-cleansing activities of the mouth by natural means which are more effective than any other.

I appreciate very much the untiring labors of Dr. Bunting in making these experiments and placing them on record. No man ever places his work on record unless he knows it is valuable, and it is always the result of unselfish desire to further the interests of the profession. These two subjects, salivary analysis and dietetic treatment, are the dentist's share in metabolism, the most important science before the public today. Our medical brethren have shared with us the field of oral surgery, considering the dentist amply conversant with this branch of their profession, and, if we succeed in our efforts in the study and analysis of salivary conditions—a study the increasing importance of which we little realize—they will share also with us this branch of medical science, the aim of which is the prevention of caries, and, no doubt, the prevention of other diseases. In this way our scope of usefulness to mankind may be extended.

Dr. Bunting (closing the discussion). I think I have taken up too much of your time already, considering the lateness of the hour and the length of time you have remained here, and I shall be obliged to omit the discussion of some of the questions brought out.

I thoroughly appreciate the discussion which has taken place, and I have had some phases of this question brought to my attention a little more clearly than before. The main reason for presenting this paper here was to get ideas, to present this before you, and to hear your discussion of the subject. I myself have been working upon this subject about three years now, and the paper, as you see, is not definite, is not dogmatic, for the reason that I have not made up my own mind. I do not say thus and so is true, and thus and so is not true, because I do not know. I am looking for truth, spending time and attention looking for it, and I need help, and that is the reason for the tenor of this paper. I am sorry that I could not present to you more definite results, and I thank you for your attention.

The session then adjourned until 9.30 Wednesday morning.

Wednesday—*Morning Session.*

The meeting was called to order on Wednesday morning at 10.30 o'clock by the first vice-president, Dr. H. S. Seip.

The first order of business for the morning session was the reading of a paper by Dr. Wm. Crenshaw, Atlanta, Ga., entitled "The Evolution of Teeth-Filling."

[This paper is printed in full at page 309 of the present issue of the Cosmos.]

Discussion.

Dr. H. E. Friesell, Pittsburgh. In his paper the essayist says that the "evolution of teeth-filling depends necessarily upon finite intelligence." I cannot entirely agree with that, because if I did I could not understand how tooth-filling could have any evolution at all. When I witness the evidence of attempts at the filling of teeth that are based solely upon nothing higher than finite intelligence, I am quite certain that much of the infinite in intelligence has been applied to the evolution of tooth-filling, or we should not have any science of filling teeth.

Our essayist says again, "We come face to face with our limitations, and find that we as often proceed on a wrong judgment as on a correct one." Now, I believe that what the essayist refers to as coming face to face with our own limitations is the recognition, on his part, that there are certain very marked limitations in the salvation of tooth structure. I take a different view; I think we come face to face only with limitations we have made for ourselves, or limitations which we are too indolent to remove. I do not believe these limitations are any great difficulties that we do not have intelligence enough to solve, but that our limitations are due to mental apathy, to lack of knowledge of the laws of physics or mechanics and of the pathology and histology of the structures upon which we work, also to what we might call mental laziness. We do not want to study; we are well enough satisfied to let somebody else point out the road we are to follow, and if this does not lead to the results we want, then we blame it on the greatness of the problem, and perhaps on "finite intelligence."

The essayist refers to a paper read by Webb in 1881 on the restoration of contour and prevention of extension of decay, in which the following paragraph occurs: "To prevent decay, operations must be performed in such a manner as to have the margin of enamel free from contact with the adjoining tooth. The enamel around a cavity and the approximal wall of a bicuspid or molar should be cut away toward the buccal and palatal or lingual walls sufficiently to insure the freedom of the margin when the operation is completed." Just who is the author of this doctrine I do not know, but I believe that it was understood long before the reading of that paper. I believe, also, that this theory was based not upon the idea of the prevention of the recurrence of decay, but upon the idea that was quite prevalent in the dental profession at that time and for some time afterward, that caries was to a large extent caused by pressure. We have gone through all sorts of theories in the evolution of the etiology of dental caries in the past seventy years, and at various times certain theories have been exploited as probably solving the question of the cause of dental caries. At the time stated, it was believed that the lateral pressure of the teeth was one of the important features, if not the actual cause of decay of the teeth. This was, of course, before Miller gave to us the bacterial theory of caries, and I believe that the practice alluded to by Webb and others was due to an effort to extend the buccal and lingual margins of approximal cavities to the point where they would be protected from the lateral pressure of the teeth. It was recognized that, even when these cavities were filled with non-cohesive gold, or soft gold as the essayist terms it, caries occurred around the margins of many of the approximal cavities, and it usually was found near the point where the lateral wearing and grinding of the teeth occurred. We all know the efforts of Dr. Arthur and others to relieve this pressure by filing or grinding away the approximal surfaces of the teeth; we also recognize the fact that there is great pressure between the teeth, as evidenced by the wearing of the enamel at that

point due to lateral motion of the teeth in the process of mastication. The fact that decay began or was frequently found at this place where pressure was the greatest naturally led many to suppose that pressure had something to do with caries, especially when we had not heard about germs. It was found that approximal caries practically always began just gingivally of the contact point, and the greatest stress is of course at the contact point, so that here was another argument favoring pressure as a cause of caries. Then, when this principle of "contact upon indestructibles" was propounded, the margins of approximal cavities were extended into the buccal and lingual embrasures, and we found that caries did not then take place as frequently around the margins and outlines of the fillings. Later on, when we became acquainted with the more modern and more satisfying theory of caries, we found that it was not due to the fact that we had relieved the pressure on that portion of the tooth, but to the fact that we had extended the cavity outlines into the embrasures where the passage or sweeping of the food through the embrasures, as it was forced down by the cusps of the occluding teeth, swept the surfaces clean, and produced a scouring action over the margin of the filling which prevented caries. The essayist says, "In the declaration of this one paragraph was made greater progress toward placing the operative feature of dentistry upon a scientific basis than in all else that had gone before." That may possibly be true, but the theory itself, upon which that operative procedure was based, we have learned since to be incorrect, and the results gained certainly justify the claim that it was an inaccurate surmise.

The pressure theory that I have alluded to seemed only to operate or be considered when caries occurred along the margins or outlines of approximal cavities, but how about conditions where we filled buccal and labial surfaces of cavities, and caries began along these margins? There was no pressure there, yet caries went on in the same manner as when there was the added condition of pressure, and this led thinking, observing men to consider that the pressure theory did not answer all of the problems presented by dental caries. Then men like Williams and Black studied these conditions, and Miller's researches proved that there was something outside of any mechanical cause, such as pressure. It is well at this time —because we are going through various stages of dental evolution—to consider these various theories. So many of us who are not mentally fitted for scientific investigation take up a theory prepared by somebody else, and accept it as truth. We believe that the theory is perfect, and we do not take the trouble to test it ourselves, or perhaps we have ourselves developed a theory that suits us, and we dispute the question with anyone who protests that it may possibly not be right. Our theory becomes our hobby and our pet, and we try to look at everything in such a way that it will agree with our theory. That is just the reverse of the scientific investigator's method. If he has a theory, and everything points to the possibility that he is on the right track to the best solution of the problem, then he begins, if he is a wise investigator, to attack that theory from every side, to undermine it, to find out its weak points, not with the idea of proving that his theory is correct, but with the idea that the parent of a child is inclined to be biased in favor of his own offspring; therefore he attacks it much more radically than if it were somebody else's idea, in an effort to prove that he is possibly wrong. In this way real progress in dental science is made, because that which will not stand every test is discarded.

After Miller had proved and others verified that caries is caused by micro-organisms, and that it can be produced artificially, then the question arose, How and why does this occur? Black, Williams, and many others since, have by their careful investigations proved that undoubtedly dental caries is a germ disease; that it has definite points of beginning; that it has definite areas of extension; that, for certain reasons, it attacks some surfaces of the teeth where

the enamel is as perfect, sound, and smooth as nature could make it, while on other surfaces it attacks enamel that is the reverse of this. From these facts we must conclude that the tooth structure itself does not have much to do with the retardation of caries; that it is a disease that attacks all surfaces of the tooth when conditions are favorable, and that its attacks are limited in protected tooth surfaces, where the conditions are unfavorable. A full knowledge of the pathology of dental caries is the foundation upon which our science of filling teeth must be based, otherwise those who lack that knowledge and depend upon finite intelligence are likely to wander into the swamps of ignorance, and fail to accomplish what they set out to do.

The essayist on several occasions uses a term which is not quite clear to me—he speaks of the cervical margin of the filling at and beneath the gum. This is important, because a little later on he speaks of the great difficulty in applying certain filling materials at the margins of cavities which lie beneath the gum. We know that the enamel extends beneath the gum, or perhaps, to express it differently, the gum covers a considerable portion of the enamel, on all axial surfaces of the teeth. A cavity outline that is extended from the occlusal surface toward the gingival or cervical margin, whichever you care to call it, is no more difficult to manipulate if the outline extends beneath the gum than if it lies above the gum, provided the outline of the cavity itself lies in enamel. But if that outline extends farther gingivally and passes beyond the enamel, and the gingival wall has its outline in the cementum or dentin, then we have to deal with a different problem altogether in filling that cavity. The essayist, therefore, in my opinion, has not been quite definite enough in his terminology.

The essayist says, "Ten years or so after Webb had finished his work and had gone, it was discovered that cementum and dentin made unsafe foundations under cohesive gold, and following upon this came the announcement of Prof. Henry Chase that, in proportion as teeth needed to be saved, gold—meaning cohesive gold—was the poorest material with which to do it." To some of us that discovery has not made itself apparent as yet. "In filling approximal surfaces of molars and bicuspids we encounter the most difficult class of filling operations to be made, because of inaccessibility, and because, at the cervical margin, the tissues are of varying and unsubstantial nature." Of course, in those places where the cavity is extended beyond the line of enamel that holds true. "At the cervical margin of the average cavity between such teeth, we encounter a foundation of cementum and dentin—structures composed of little less than one-third of organic or nerve tissue, and some more than two-thirds of intertubular substance—calcium phosphate and carbonate. On account of this combination of nerve fibers and the low resistance to decay of this and the intertubular substance, cementum and dentin as a foundation base are unsuited for permanently successful adaptation of cohesive gold." As far as the structures are concerned in their resistance to caries and in their affording a sound foundation for any kind of filling material that is indestructible in itself—cohesive gold, non-cohesive gold, or amalgam—I believe the question hinges upon whether or not the gingival outline of the cavity is laid entirely in enamel. If it is laid in enamel and the operator understands the physical principles that govern proper and perfect adaptation of cohesive gold to the gingival wall and gingival outline, there should be no less certainty in his being able to obtain a perfect gingival margin for his filling at that point, provided, of course, other proximal requirements of the filling are taken into consideration. Of course it will be a little more difficult to place cohesive gold at that point, because it must be used in smaller pieces, and every portion of it must be more carefully malleted than if non-cohesive gold or amalgam were used. But if the operator is willing to take the time and pains, there should be no less certainty, if he observes the physical requirements of these various materials, of perfect adaptation along the

gingival third of these approximal surfaces of the cavity with cohesive gold or amalgam than with non-cohesive gold.

The paper further states: "These structures [cementum and dentin] do not afford the resistance necessary for the adaptation of a crystalline gold, and we have therefore crystalline gold laid upon a foundation one-third of which is nerve fibers, probably weeping moisture in the joint or drawing moisture to this joint from without by capillary attraction, owing to this form of gold and the likelihood of chafing or of fracturing the cervix angle of these cavities from malleting." The questions that the essayist brings up in regard to the composition of the tissue at this point, weeping of moisture and so on, I am not able to combat, owing to my limited knowledge of histology, but as to fractures of the cervix angle of these cavities due to malleting, I believe there is less danger of fracture of dentin than there would be of enamel, and if we can place the gold, cohesive gold especially, along the enamel margins without fracturing the enamel, we should be able to do so at the gingival margin of dentin, and it can be done, if the operator understands the physical principles involved in packing and condensing gold. If he understands the histology of the enamel borders, the forming of the cavo-surface angles without short rods, he makes the strongest possible margin in enamel.

The essayist further says: "Soft or non-cohesive gold foil and tin foil, both of which are non-crystalline in form, adapt themselves by reason of their soft, laminæ-like folds to the soft and partially vascular dentin and cementum, after the fashion of a cork being compressed into the mouth of a bottle, and for this reason these materials are made to conform more perfectly to the floor and the walls of a cavity in such structures. Cohesive gold, because of its crystalline nature, unyielding and angular, does not and cannot be adapted with the same facility for making moisture-proof joints at these points." Let us consider this for a moment. We frequently hear the term "soft" gold used for non-cohesive gold. The gold which we call non-cohesive is the same as that which we call cohesive gold. Gold is an element, and we cannot reduce it to anything else, and soft gold, so-called, is just as hard as cohesive gold. While the hardness and softness of gold in the thin sheets that we must use for filling teeth is immaterial, cohesive gold, which must be annealed, is softer, if anything, than soft gold, which is not annealed. The only distinction between the two is that some foreign substance—foreign in the sense that it is not gold; it may be simply a condensed gas—is placed on the surface of the non-cohesive or soft gold, and that prevents the leaves or the laminæ of the non-cohesive gold from sticking together and makes it seem really softer. A mass of it can be placed in one portion of the cavity and rolled around without the leaves sticking together, as would be the case if we were trying the same manipulation with cohesive gold. Cohesive gold can be adapted as absolutely and perfectly to the cavity wall or outline of the cavity angle as can non-cohesive, but it cannot be used in such large masses, and the operator who does not understand method, system, and order, and who attempts to use cohesive gold at the gingival margin or any other place in a haphazard way, without taking into consideration the physical requirements of that material, cannot do as well with cohesive as with non-cohesive gold. An understanding of the physical conditions is required in the use of every material. We do not condense amalgam as we do gold, nor do we condense gold as we do amalgam, and two entirely different forms of gold are entirely different in action. Recognizing the fact that one of the principal properties of gold, its cohesive quality, is obscured in the non-cohesive gold, why should we expect to use the two alike with uniform results.

It has not been my intention to disagree with the essayist in my remarks, but I wished to emphasize the fact that there are two sides to the question, and that many of us look at these matters from different viewpoints. For fear that he may misconstrue my viewpoint, I am glad that with one portion of the

paper I agree most heartily, and that is in regard to the use of inlays and the binding material—cement. There is a field for porcelain inlays and a field for gold inlays, but the field for both of these materials or methods is infinitesimally small as compared with the field for gold, cohesive, non-cohesive, or both combined, and there is a much larger field for the combined use of cohesive and non-cohesive gold than most of us have been realizing.

In concluding his paper the essayist says: "Viewing the evolution of teeth-filling through a perspective of half a century, we are forced to admit that since the discoveries of Arthur, Barnum, and Webb, the gain has been esthetic rather than substantial, and that we have improved appearance at the expense of permanence." It seems to me that one familiar with the progress made in operative dentistry within the last ten years, on reconsideration of that paragraph would alter it to some extent, so as to say at least that the gain in recent years has not been unsubstantial and not solely esthetic, but rather has been marked by the gaining of the scientific knowledge of the cause, the beginning, and the progress of caries, and by an increased familiarity with the laws of physics and the development of the means of applying them in our operative technique.

Dr. J. D. WHITEMAN, Mercer. I consider myself particularly fortunate in being permitted to listen to this paper, and I regret that I have not been able to prepare a written discussion, that I might do better justice to it.

Notable in the early beginnings of the filling of teeth is the fact that the sole consideration seemed to be the sealing of the cavity, but with their limited training and still more limited equipment, and limited choice of materials, having but non-cohesive gold, what more could the early operators do than simply stop or plug the teeth? With becoming modesty our early predecessors spoke of their productions in operative dentistry as "plugs."

In the preparation of the cavity, the outline was determined by the condition of the enamel margins, viz, the soundness of the enamel. We will concede to the early operators the ability to seal hermetically or "stop" a cavity, but that is about all that they were able to do with the material and equipment that they worked with. Compare this with the preparation and insertion of a filling today! The cavity outline is determined by the area of susceptibility still remaining, and any filling in a cavity the outlines of which have been determined by any other factor is necessarily a temporary operation. Teeth the cavities in which were not extended, in 1850, '60 or '70, to the limits of the area of susceptibility, decayed as readily as teeth will decay today if cavities in them are prepared in that faulty way.

The essayist speaks of Dr. Webb's statement that the area of contact must be removed. This contention was based solely upon the clinical observation that teeth decayed at that point. I do not think, however, the claim can be made that Dr. Webb, when he made that statement, had in mind the same idea as Dr. Black when he promulgated the theory of extension for prevention. Dr. Webb may have extended cavities, but upon a purely empirical basis. It required the discoveries of Miller and Black to determine when, where, how, and why to extend, and to place the filling of teeth upon a scientific basis.

In regard to the virtues of tin as a filling material, I would merely state that there was a time when the use of this material was almost necessary in approximal cavities. When it was the custom to make heavy undercuts at the gingival base, leaving a wall of unsupported enamel, it was of course quite impossible to condense there non-cohesive or cohesive gold without danger of fracturing the enamel, and caries would recur, when that portion of the filling was not condensed; it was necessary to use tin in such instances. If the cavity is prepared along rational lines as indicated by Black, with every point accessible, it is quite possible to condense the filling at every point, and it is not necessary to

put tin under the gold and have that portion of the tooth discolor.

With regard to the weakness of cement as a binding material for gold inlays, I am reluctant to concede that the value of the gold inlay is limited to simple surface cavities, because this would mean an admission that we cannot safely place the margins of a gold inlay beneath the gum. While we all recognize that oxyphosphate cement is our only medium for setting inlays, except occasionally gutta-percha, and that exposed cement is but temporary in durability, it is a fact that protected cement used under a well-fitting crown or inlay will remain for many years, and I have inserted many inlays that have remained in place ten years or more. I believe that exposed cement is the least dependable material, but protected cement is the best; it is most compatible with tooth structure, and secondary calcification will go on more normally in deep cavities, if there is a lining of cement between the pulpal wall and the metallic filling.

Another very important point in regard to the gold inlay is our ability to restore the occlusal surfaces anatomically, reproducing the marginal ridges and sulci accurately and minutely, a factor which has been neglected entirely too long, and which is practically impossible with the cohesive gold filling, never having been done with the non-cohesive gold filling, and but rarely with amalgam, although it is so easy. I think attention should be called to that point.

The evolution of tooth-filling cannot be by any means regarded as finished. Perhaps there is still much to apologize for in the way of esthetics, but I think it can be safely said that the profession has developed tooth-filling to the point where we can maintain that we can successfully combat caries, and in my opinion we are therefore justified in taking our place among the learned professions as "workmen needing not to be ashamed."

Dr. F. D. Gardiner, Philadelphia. The paper has already been so completely discussed that there are very few points left upon which I may make any observations. I fully agree with the essayist in many of his conclusions, and particularly in regard to amalgam and inlays, but in regard to his statements as to cohesive gold, I shall have to take exception, and, in order to do that, I shall have to quote from my own personal experience with these materials. My own observations have forced me to the conclusion that results are very largely dependent upon the personal equation. One operator will succeed admirably by a certain method and certain materials, while others will fail. No one method or material can be equally successful in all hands. Each operator should use that which in his hands produces the best results.

I was taught to use soft gold at the cervix, and finish with cohesive gold, and for some few years I succeeded, I believe, as well as others who were no more skilful than I. But when I commenced to extend the outer margins of cavities to the immune area, I found that cohesive gold was more adaptable to the cavity formation. I began the systematic practice of extension for prevention about 1881 or '82, and since that time I have used cohesive gold with most gratifying success directly on the cervical wall, regardless of whether that wall was above or below the gum margin. I usually placed No. 60 rolled gold directly against the walls, for the reason that I could place it more accurately, solidly, and with less force than was possible with any other form of gold. These fillings, many of which were placed twenty to thirty years ago, are my especial pride today. Many of them were inserted in teeth of medium structural solidity, and below. Some other fillings, made entirely of soft foil, but in simple cavities with circumscribed walls, were inserted about thirty years ago, and are still in perfect condition today.

No one material is adapted to all cavities or conditions. Materials should be prescribed to meet conditions. When will the profession as a whole learn to treat caries of the teeth as a disease? According to my observation, there is an insistent and growing demand on the

part of the public for the elimination of gold in the anterior teeth, and since the advent of porcelain and other filling materials, I have almost entirely eliminated gold from the anterior teeth, very much to the gratification of my own esthetic sense as well as that of my patients. I have many patients who will not submit to the use of gold where it will disfigure their teeth, and I find that sentiment growing rapidly.

Dr. JAMES TRUMAN, Philadelphia. I want to thank my friend Dr. Crenshaw for coming from Atlanta to uphold the old methods of filling teeth, as I understand his paper. The period in which we are living, it seems to me, is one of change. Men are growing tired of old methods; they are taking hold of what may be called new ideas, and forgetting the old ideals which prevailed more than half a century ago. For my own part, I always feel a sense of regret that the ideas of sixty and seventy years ago have almost entirely been eliminated from the work of the dentist of the present time. I cannot agree with my friend Dr. Crenshaw in his statement that there was no filling of teeth, apparently, prior to the period of Marshall Webb. I was a co-worker of Webb; in other words, I worked alongside of him; I knew of his operations; I knew the man, and I knew of his aspirations, but I did not agree with him at that time, and have not been able to agree with his ideas from that period to the present. I know very well that, long before Webb, fillings were placed in teeth that were equal in every respect to Webb's. Some of us know very well that the work of Elisha Townsend and Dr. Arthur could not be excelled at the present time. I have stood alongside of Dr. Elisha Townsend when he was filling root-canals, and I assert here, without fear of contradiction, that there is no man in this room, including myself, that could fill a root-canal with gold with the same amount of skill as Dr. Townsend did over sixty years ago.

Now we have new ideas. Webb instituted, to a certain extent, the so-called method of extension for prevention, although he did not call it that, but it means cutting away of tooth structure, a method I can have no sympathy with. There is no extension for prevention that can be sustained by observation histologically or pathologically; there is no place in tooth structure in my opinion—and I have spent a good many years in histological study of the tooth structure—that is absolutely immune from attacks of caries. But I will not discuss this subject now. I wanted simply to thank my friend Dr. Crenshaw for giving us this valuable paper.

This matter has been discussed too extensively. If it had been brought up several years ago, I would probably have said to Dr. Crenshaw that we know all about filling teeth, and have known for many years, why then take up that subject? But I have learned since that time that we must go back to first principles and acquire skill in the insertion of inlays, the modern method of filling teeth.

Dr. JESSE GREEN, West Chester. I might say that I am almost a stranger here today. I did not expect to partake in the discussion, since I have not heard the paper.

I remember Dr. Elisha Townsend very well, and when I think of the work which he did, I feel tempted to ask some of my friends of later years if they could fill teeth in the manner that he did sixty years ago, at the least. I was well acquainted with him, knew the work he was doing, and it seemed to me that he could put a filling in a tooth with hardly any crown left, and have it last for many years. Like Dr. Truman, I have watched Dr. Webb and many other men of that time operating, but I have not seen Dr. Townsend's superior. I remember very well a little incident which occurred in connection with Dr. Townsend, when I had occasion to go before him for examination to become a member of the Pennsylvania State Dental Society. Until then he had been condemning the use of alloys. He had said an alloy was simply a mixture of a lot of metals with a little quicksilver to amalgamate them. But he said to me at that time, that

since they were now using pure metals, he must confess that it was right to adopt the amalgam filling.

As I have just said, I have watched Dr. Webb and many of the men of that time, and I must acknowledge that I have never made any of the cast gold inlay fillings that are being inserted in teeth today, and held there by cement. We used the old-fashioned non-cohesive gold, made down on Walnut st., which we thought was pretty good. It took some mechanical dexterity to fill a tooth in that day. I frequently have patients —and you will please excuse me for this personal remark—come to me with fillings that were made fifty years ago, and are in as good condition today as when they were first put in. As for filling the root-canals of the teeth, we always found that very difficult; indeed, it required a good deal of mechanical ingenuity to do it.

Dr. Crenshaw (closing the discussion). The chairman of your Program Committee requested me to prepare a paper on this or a kindred subject. It suited me to do this, because I thought that it indicated a desire, on the part at least of the chairman of the committee, to have brought forward the methods that have been relegated more or less to the background by the introduction of the cemented porcelain and gold inlays.

I did not undertake to discuss the cause of caries; I did not undertake to say what causes caries to begin at the contact point, although I do not hold the theory mentioned by Dr. Friesell, that pressure is responsible. The investigations of Miller and Black, and others who have delved into the causes of caries, show that the same causes operate at these points as at others. My subject was the development or evolution of tooth-filling, and I wished to pass in review as rapidly as possible the methods that have been introduced over a period of forty-odd years.

I was astounded, then, at the lack of a system in filling teeth. I have seen fillings of soft or non-cohesive gold that were inserted by Dr. Maynard, Dr. Emerson, and others, and have preserved the teeth for forty to fifty years at and beneath the gum margin; but these were simple flat surface fillings, and taught nothing as to contouring, or as to anatomical restoration, or the preservation of the festoon or septal spaces. I therefore followed Webb and Brown with intense interest, because, when Webb first promulgated his method of filling teeth, it seemed to me that he had given the world a system that must solve the problem. Soon after the Webb propaganda began, I went to New York to see Webb and Brown perform their cohesive-gold operations, which they afterward demonstrated in almost every state in the Union. I felt that a system had been inaugurated with which we would be invincible before the world. I felt that cohesive gold used in the manner of these operators, viz, going back from the contact point and anchoring these fillings in sound coronal areas, and ovaling the surfaces from the contact point to margins about the gums, was the perfection of the art of filling teeth. I thought our profession was emancipated from the chaotic condition that so distressed me at that time, because it was then an everyday occurrence to see teeth that had been filed, leaving unsightly separations between them. I thought, therefore, that our makeshift methods had given way to a most beautiful scientific and perfect method.

I agree with Dr. Truman and Dr. Green that there were men living then who occasionally did exceptionally beautiful work, and I appreciate the fact that Dr. Varney at that time did some very exceptional work in filling teeth. But I followed most religiously the teaching of Webb and Brown, to find that, after a lapse of time, their contour operations with cohesive gold were giving way at the cervical margins. I found that to be the case in the only gold filling ever made in my state by Webb, and I observed the same with the work of Brown after it had been in the mouth for fifteen or twenty years, as well as with my own work, and that of many others.

Dr. Friesell agrees with me that, if we get beyond the enamel margins, we get into quicksand. He does not say

that exactly, but when we insert cohesive gold in structure composed, like dentin and cementum, of about one-third nerve tissue and two-thirds of what we call intertubular substance, we will invariably fail. This work fails, I believe, because cohesive gold cannot be adapted to the cervical margins with the same chance of succeeding permanently as with non-cohesive gold.

I think Dr. Friesell agrees with me that, after the enamel is gone, we have a more difficult operation, and you will bear me out, I think, when I say that for those deep chasm-like cavities between the molars and bicuspids, extending below the enamel margin, we cannot find a more adaptable and a kindlier material than soft foil. And so I have endeavored to follow the best light before me, to exploit the saving quality of non-cohesive gold as proved by the old masters, and to master its use as it now may be mastered, at the cervical margin, viz, covering it over, after building the soft foil high enough up the wall, with cohesive gold at the point where it comes in contact with the enamel margins.

Dr. Gardiner mentioned that the enamel margins would be more easily broken with a mallet than would the softer structures, dentin and cementum. But if the enamel margins are shaped at the surface angle as they should be, and the mallet and foot plugger are applied with proper understanding, the enamel edge will not be fractured, because it is denser than cementum, although it is friable; these facts enable us to get an adaptation of cohesive gold that lasts indefinitely. Non-cohesive gold, when put below enamel margins, I have found will stand indefinitely; I believe it will last through any average life.

I have watched the work of Webb and Brown done in my state in 1881, which, for a period of fifteen or so years, stood with the enamel margins perfect and apparently would last through life; but these operations had given way at the cervical margins in the cementum and dentin.

I do not like to criticize anybody's work, but we are trying to work out these problems, and if what I hold with reference to the saving quality of soft gold is a fact, the problem is solved.

The next order of business was the report of the Council, by the secretary, Dr. L. M. Weaver.

Motion was made and carried that the report be adopted.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—H. S. Seip, Allentown.

First Vice-president—J. G. Lane, Philadelphia.

Second Vice-president—H. E. Friesell, Pittsburgh.

Recording Secretary—L. M. Weaver, Philadelphia.

Corresponding Secretary—G. S. Schlegel, Reading.

Treasurer—W. A. Spencer, Carbondale.

Board of Censors—F. W. Allen, D. B. Williams, E. W. Bohn, A. S. Koser, and C. M. Bordner.

Dental Examiners—C. S. Van Horn, H. W. Arthur, J. J. Moffitt, and C. V. Kratzer.

Council—F. L. Davenport, Joseph Huggins, and C. Bachman.

Delegate to the National Dental Association—H. S. Seip, H. B. McFadden alternate.

Motion was then made and carried to adjourn until the afternoon session.

Afternoon Session.

The meeting was called to order at 3.30 o'clock by the president, Dr. Kratzer.

The next order of business was the reading of a paper by Dr. Raymond C. Osburn, New York, N. Y., entitled "The Evolution of Occlusion, with Special Reference to That of Man."

[This paper was printed in full in the December issue of the Cosmos, vol. lv, p. 1236.]

Discussion.

Dr. M. H. Cryer, Philadelphia. It has given me much pleasure to hear Professor Osburn's paper and see his illustrations.

I shall not discuss the paper, because the essayist has simply given us facts pertaining to the subject presented. I wish to thank Professor Osburn personally for giving this society the opportunity of hearing his paper.

Dr. J. F. Biddle, Pittsburgh. I agree with Dr. Cryer that our essayist has left practically nothing for discussion; still I am sorry that we did not have the privilege of reading Dr. Osburn's paper before the meeting.

In our study of comparative anatomy, we observe that in the lower forms of animal life a framework is present, usually in the form of a covering or shell on the outside of the body for its protection. With the progress of evolution, we find that, in the higher forms of animal life, this external covering gradually disappeared, and that an internal framework was developed, the purpose of which was to support the body rather than to protect it. It is noticed also that the teeth became more fully developed and specialized, according to the habits and environment of the animal, until in man we find teeth of the most perfect type, combining all the good features of those of animals and the elimination of all the bad ones, with the exception of their tendency to decay and malocclusion, the penalty of man's advanced stage of civilization.

In cases where the teeth are supported only by the connective tissue underlying the skin, they are easily torn off, but nature has provided admirably for this contingency by continually supplying new ones. In the more highly developed forms, the jaw-bones support the teeth by growing around the roots, but unfortunately, in these cases nature does not come to the rescue to refurnish the oral cavity with teeth throughout life. Therefore it falls to the lot of mere man, of the dentist, to put forth his best efforts to conserve the teeth to their limit, which should be for a lifetime.

The wonderful mechanical arrangement of the teeth in their most highly useful form, as exemplified in man—the combination of teeth such as are adapted both to a carnivorous and herbivorous diet, together with nature's wonderful work in forming the roots and crowns so as to afford the greatest beauty, makes us marvel, and question whether we devote sufficient time and study to these highly important and essential organs. A more careful study of the size, shape, and occlusion of the teeth, together with normal contacts with their associates, should be of as great value to the average dentist as to the orthodontist. In our zeal for newer and improved methods in operative and prosthetic procedure, are we not apt to lose sight of the fundamentals, the laws upon which rests the practice of modern dentistry?

Malocclusion seems to have been prevalent among all races and even among the lower animals, although among the latter it is exceptional. In the skulls of ancient races many cases of malocclusion are noted, but this anomaly is now much more prevalent. In fact, a careful study of the subject would seem to indicate that malocclusion has advanced steadily with civilization, until, at the present time, it is the exception rather than the rule to note perfect occlusion.

We notice also, in the development and evolution of the teeth, that the disuse of the jaws as weapons has produced a marked reduction in their size, as well as in that of the teeth. The comparative disuse of these organs in eating has exerted a similar influence. The diet of the earlier races—coarse foods, roots, herbs, corn, and uncooked meats—had a tendency to develop both the muscles and bones of the jaws, hence the processes for attachment of the muscles were correspondingly larger and more prominent.

Dr. I. N. Broomell, Philadelphia. I have always been opposed to the use of a remark frequently made in dental and other gatherings to the effect that —"I feel in full accord with everything that the essayist has said." I mean by this that the most that can be gotten out

of any subject must be by argument or by discussion, but we must recognize the fact that there are two classes of subjects, one the discussable, the other the non-discussable class, and, as you have already been told, this paper is not discussable, as it is full of facts rather than theory.

I have for a number of years been interested in occlusion and articulation as applied to the teeth. It has been a very delightful study, and it has given me a great deal of pleasure to listen to Professor Osburn this afternoon. He has intimated that nowhere do we find the laws of nature more fully carried out, viz, the law of function governing organization, than in the jaws and in the teeth, and, while this applies perhaps more forcibly to the teeth of the lower animals, I believe it applies with almost equal force to the teeth and dental mechanism of man. Here we have a wide range of formation in the crowns of teeth and in the arrangement of the teeth in the maxillary arches; we have a variety in the occlusion, and above all, in the articulation of the teeth, each one of which applies to a type or temperament. I am surprised not to have heard the word "articulation" used, but only "occlusion," and my knowledge of these two terms makes me believe them to be entirely different and separate. We can have occlusion, and yet not have function. I understand occlusion of the teeth to be an anatomical term, while articulation is purely physiological. It seems to me that the orthodontist of today thinks of occlusion only, and gives no attention whatever to articulation. After the teeth come together or occlude, some other factor must enter to bring about the function of the teeth. We must have occlusion, of course, but we may have occlusion and yet no function unless the teeth are arranged so that they articulate properly, and can carry out their intended function.

The essayist made reference to the condyles, which pleased me very much, because, in my studies of this subject, I have always considered that there is a definite relationship between the tooth form and the form of the condyle. In the nervous type, for example, the teeth have long penetrating cusps, and the condyle is thin, forming an articulation nearly like the hinge joint; while in the other extreme, as represented by the lymphatic type, a characteristic temporo-maxillary joint resembling a ball and socket is found.

Dr. Osburn (closing the discussion). I have nothing to add to the discussion. I might say in explanation of my omission of the use of the word articulation that, as I understand occlusion, articulation cannot take place unless the occlusion is perfect.

The meeting then adjourned until 10 A.M. on Thursday.

Thursday—*Morning Session.*

The meeting was called to order on Thursday morning, September 26th, at 10 o'clock, by the president, Dr. Kratzer.

The first order of business was the reading of a paper by Dr. R. H. Ivy, Philadelphia, Pa., entitled "Methods of Fixation in the Treatment of Fractures of the Mandible."

[This paper is printed in full at page 261 of the present issue of the Cosmos.]

Discussion.

Dr. G. M. Dorrance, Philadelphia. The method of treating fractures of the mandible by the use of a chin-cap and a Barton bandage has not been satisfactory—first, because the Barton bandage does not hold the parts in approximation, and second, because the alinement of the teeth is not carefully provided for. I have had two cases in which it was impossible to use any appliance, on account of acute alcoholic delirium, and I found that they did practically as well as those treated by the above method. This is the accepted method of treating these fractures, the reason being that it is easy and requires no mechanical appliance, but it is not to be recommended.

The second method discussed by Dr. Ivy, in which the teeth are held together by wires placed around one or more teeth, thereby approximating the frac-

ture, has not been satisfactory, as the wires become loose and break, and the teeth themselves loosen. The method of extra-internal splint, by which term I mean the Matas splint, or my modification of the same, is not satisfactory, and I have given it up. It consists of a plate, very similar to an impression plate, which is fastened to the teeth by impression wax. This plate is connected to a chin-cap by means of rods which can be tightened to produce the desired approximation. The method of choice is, as Dr. Ivy states, either the intradental splint for simple fractures anterior to the molars, or the intramaxillary splint when the fracture is posterior to the anterior molar. With the intradental splint and intramaxillary splint, it is the alinement of the teeth which is sought, and not necessarily the alinement of the bone, for, after all, the alinement of the teeth is the important factor; for if this alinement is not correct, mastication will be interfered with, and one or more teeth will have to be sacrificed. The intramaxillary splint should be made so that the upper and lower teeth are practically in apposition. It is not necessary, in these cases, to have any aperture for feeding, as liquids can be taken either through an aperture caused by the loss of a tooth or posteriorly to the molars. In fractures of the angle of the jaw, that is, in fractures posterior to the molars, it is essential to have the teeth in apposition, otherwise the bones will unite at a vicious angle, and approximation of the teeth after the removal of the splint will not be possible. In regard to fractures of the coronoid process, it does not seem to make much difference what apparatus is applied, as long as early motion is obtained, in this way preventing ankylosis.

As to operative treatment of these cases by means of wires with metal plates, I have seen a great many of these cases operated upon, and, unfortunately, operated upon one myself, because I could not hold the parts in apposition in any other way.

What is the usual result in these cases? After the plate is screwed in place and the wires are approximated, the edges of the bone will of course be in apposition. After several days the screw becomes loose and the wire erodes a larger opening in the bone, and movement begins. This is usually followed by suppuration, and it becomes necessary to remove the plate or wire, and subsequently one or more pieces of bone are extruded.

I fully agree with Dr. Ivy, because I have tried all the methods described by him, and the method which he has discussed today has given me the most excellent results.

Dr. M. H. Cryer, Philadelphia. In discussing this paper I can only confirm what Dr. Ivy has said, and indorse the opinion of Dr. Dorrance. To substantiate further the points brought out by Dr. Ivy, I will show a few slides which will illustrate the ill effects caused by bandaging and wiring fractures.

[Dr. Cryer then showed a number of slides confirming the points brought out in Dr. Ivy's paper.]

Dr. C. N. Russell, Philadelphia. This subject has been so thoroughly covered by Dr. Ivy, indorsed by Dr. Dorrance, and sworn to by Dr. Cryer, that there seems but very little for me to add. My only hope, then, is to grasp at the last words of Dr. Ivy's paper and possibly digress somewhat from the mode of treatment of fractures, and wander into the field of the sequelæ or complications of fractures.

There is no condition which confronts the dentist that is surrounded by so many dangers, as far as permanent deformities and professional reputation go, as fractures. The mechanical errors which are frequently seen do not arise so much from awkward manipulation or deficient dental skill as from the ignorant application of the bandages applied by physicians. What can be covered up is, in many instances, a satisfaction to the patient as well as to the attending physician, and that is one of the principal reasons why the Barton bandage is applied. It is surprising, however, how a primary deformity may later become readjusted as far as occlusion is concerned. I have seen many

cases treated by the simple application of bandages, which later on, through elongation of the teeth and readjustment of the occlusion, have given fairly satisfactory results.

The underlying principle of treatment of all fractures is the use of common sense. There is no particular appliance which is designated for all cases, a great deal depending on the patient's physical condition, his age, the position of the deformity, the condition of the fracture, and the amount of distortion it has caused. Primarily, of course, I would censure or condemn wiring and the application of splints. The most satisfactory results I have seen produced by splints have been found in text-books. The mechanical skill displayed by these drawings appeals very markedly to the dentist, but when he attempts to employ these appliances practically, he is very much discouraged with the results.

To begin with, a compound fracture with no particular complications, after the relaxation of the muscles and the proper adjustment of the fragments, will heal of its own accord with satisfactory results. However, a fracture in a tuberculous subject, an elderly person, or a syphilitic, is fraught with a great deal of danger as far as satisfactory results are concerned. We should resort to interdental splints, of course; but if the conditions are averse, a number of teeth having been loosened by pyorrhea, the application and adjustment of a splint will increase the pyorrhetic condition, thus contra-indicating the interdental splint.

In fractures posterior to the teeth, it is, I think, somewhat of an oversight to say that the posterior fragments should be disregarded so far as fractures themselves are concerned. Especially in syphilitics, where there is no union of the fibers, a false joint may be established following the suppuration of the diseased tissues.

I recall the first case of wiring that I ever did. I consulted Dr. Cryer, who said that he had not wired a case in twenty-five years, so I decided that it was about time to wire one, and I wired this case. In this individual there was a marked deformity, and a certain amount of suppuration occurred, but the same would have occurred had there been an interdental splint adjusted primarily. This application of the interdental splint usually requires a certain amount of time. An impression must be taken, and the traumatic conditions must necessarily be treated; therefore, often forty-eight hours have elapsed before the bones are readjusted, and a certain amount of fibrous union, and of infection, has taken place between the fragments, which interferes with the application of the splint. Frequently, because of trouble in making the plate fit, several impressions must be taken, and in the meantime the deformity becomes greater.

In a great many of these cases that condition can be at least temporarily avoided by wiring the upper teeth to the lower ones, and readjusting the fracture so that the interdental splint may be applied later. Often it is not necessary to apply the interdental splint at all, because, when the muscles become adjusted and relaxed, a certain amount of fibrous union occurs, and the fragments remain in position of their own accord.

The complications of fractures are the distressing part of the treatment. If there is a dental complication, it takes sometimes three or four days to comprehend that disease condition, which, in the meantime, spreads from one tooth to another until myelitis sets in, or the jaw may be swollen from an abscess which may dangerously complicate the case. Another complication may arise from the nerves between the fragments of bone causing a distressing amount of pain. If the jaws are held in a fixed position for a great length of time, ankylosis may occur in the temporomandibular articulation which may be as grave as the primary fracture.

Drainage is an important factor, and, if it can be arranged through the mouth it is always preferable, but frequently, when the splint is applied, the drainage has to be external. At the hospital we have at the present time a case of fracture in which the whole anterior portion of the mandible is destroyed as the re-

sult of necrosis. A dental appliance was made to hold the remaining portions in place, and, while it is not very esthetic in appearance, it is becoming more useful each day.

With regard to wiring, I believe that it has its place, in spite of what has been said today. The principal feature to remember is that we must first make an efficient diagnosis of the case, determine whether the fracture is complicated by a dislocation of the articular joint, or whether it is a complicated or a multiple fracture, and this, of course, is facilitated by the use of the X ray. I believe that an X-ray picture should be obtained in all these cases if possible, because frequently, in a multiple fracture, one may be easily misled in the diagnosis without an X-ray picture. Other features to be attended to are complete cleanliness of the parts, close observation as to the presence of an abscessed tooth which may be constantly discharging into the line of fracture, accurate adjustment of the broken fragments, and the application, if advisable or possible, of an appliance which will enable the patient to use the jaws, such as Dr. Dorrance spoke of. It is especially desirable, if possible, to have relaxation of the muscles and motion of the mandibular articulation. If, after an appliance has been placed into position, infection sets in, the condition is probably a great deal more dangerous than if simple wiring had been resorted to originally.

Dr. T. A. Hogan, Pittsburgh. The splendid paper read by Dr. Ivy presents to us the details of a subject that is more or less shunned by the dental profession. The reason for the apparent neglect of this important part of dental practice is the lack of full authority to practice oral surgery, this lack of authority hindering the dentist from giving to suffering humanity his service in its fullest sense.

The contention has been made that the dentist is not competent to perform surgery on account of his lack of training in anatomy, physiology, pathology, bacteriology, therapeutics, etc.

If this is so, how can we reconcile the fact that men who have spent but three six-months' terms in medical colleges are today performing general surgical operations? I do not make this statement by way of criticism—for some of the best surgeons in this country have attended a medical college for but three short terms—but I wish to show that the dentist who attends three eight-months' terms in a dental college should be permitted and encouraged to practice within the narrow confines of oral surgery.

We are a growing profession, and the bonds must be removed so that the dentist can practice dentistry in its broadest sense, and with the fullest authority may treat every case pertaining to the oral cavity, be it constitutional or local, medical or surgical. I hope that after the re-establishment of the four years' course in dental colleges, no excuse can be offered for denying the dental profession this freedom of action in treating oral lesions.

Fractures are divided by writers into two general classes, viz, simple and compound; these are again classified into single and multiple, which, in turn, are subdivided into transverse, oblique, longitudinal, comminuted, stellate, and green-stick fractures.

Many factors tend to simplify or complicate the treatment of a fracture of the mandible, namely, the age and health of the patient, location and nature of the fracture, traction of the muscles, relative articulation, or edentulousness. Great care must be taken in maintaining the continuity of the bloodvessels and nerves, as the severing of either causes unpleasant complications, and adds to the difficulty of effecting a recovery.

Every case of fracture is a law unto itself, and the method of treatment or the appliance to be used must be determined as a case presents itself.

Dr. Ivy describes very clearly a number of appliances and their preparation and application, and, while the band-and-bar appliances seem to have replaced the vulcanite interdental splint, yet the latter still has a place in the armamentarium of the oral surgeon.

Among the number of appliances de

scribed, the one that appealed to me most was that invented by Hullihan and Moriarty. It is equally good and serviceable either as a maxillary or as an intermaxillary splint, and combines the advantages of most of the other splints. In applying it, however, a very great deal of care has to be employed in taking the plaster impression; I would suggest that a V-shaped piece of wax be placed longitudinally in the floor of the tray and likewise a number of like-shaped pieces of wax transversly across the sides and floor of the tray. After removing the tray in the manner advised by the essayist, a small sponge is saturated with water and passed over the impression in the mouth. This enables the operator to remove segments of the impression without any undue stress or annoyance to the patient; of course, this entails rapid work on the part of the operator, if he wishes to secure the best results.

When the articulation is not normal, or when the jaws are edentulous, the interdental splint is indicated, as it is also in cases of multiple fracture; either the Hullihan-Moriarty splint mentioned by the essayist or the old vulcanite interdental splint can be applied, always keeping in mind the shortcomings of the latter, viz, lack of cleanliness and tendency of the fracture to unite in a false position, thereby preventing the proper closing of the jaws after union has taken place. This can be obviated somewhat by removing the splint just a little before complete union has taken place, and resorting to the use of bandages alone, when, by gentle traction, the jaws can be brought into correct relationship and retained until complete recovery has taken place. Comminuted fractures, which are usually compound, should be treated in a hospital, so that every possible precaution can be taken to prevent infection.

To my mind, wiring is next in importance to the splint in the treatment of fracture of the mandible, and can be used to advantage in connection with the splint in many cases. In fracture of an edentulous jaw, for instance, or in cases where there is a double fracture, one break occurring at the mental foramen and the other at the angle of the ramus, or in fact at any place posterior to the last tooth, a combination of the two methods can be used to decided advantage.

The essayist has described the different kinds of bandages used in the treatment of fractures of the mandible, and I think that in every case some form of bandage suitable to the case should be used, whether the case is simple or complex, as it helps to maintain surgical rest, and in this way aids in a rapid recovery.

Dr. Ivy refrained from speaking about constitutional treatment in cases of fracture, no doubt desiring to limit himself to what the title of his paper expresses. It may not be amiss, however, to suggest, with his permission, that in every case of fracture magnesium sulfate should be administered early, serving a twofold purpose, viz, to abort any threatened infection, and to lower blood pressure, thereby lessening the pain incident to fracture.

Treatment for shock and for disordered nutrition are important factors to be considered in connection with the fixation of a fracture, but must be left to the oral surgeon treating the particular case.

Dr. T. C. Stellwagen, Sr., Philadelphia. I would like to call attention to a splint which was described and used by me thirty or more years ago. Unfortunately, I did not hear the first part of the paper, and this appliance may have already been spoken of. At Blockley Hospital one case was particularly successful with this appliance only. A woman had been hurt in a fight with her husband, and suffered from a bad fracture of the jaw. I wanted some appliance that would serve as a temporary splint, and also do away with the method of wiring the teeth. I made a series of silver impression trays without handles, of sizes to suit different jaws. Holes were bored through the trays so that they could be wired together when used as splints in the mouth. The trays were filled with softened pink gutta-percha and adjusted upon the teeth of both

jaws, after the fracture had been set. After proper measures for cleanliness and disinfection had been taken, and occlusion secured, the two trays were inserted and wired together. In a few days these splints may be taken off, and a more permanent splint inserted if required. These appliances hold the teeth together and in proper juxtaposition until the fracture of the jaws or alveolar processes has united.

Dr. J. F. Biddle, Pittsburgh, Pa. I have been rather surprised in listening to this paper and its discussion to note that no mention has been made of the Angle bands for reducing fractures of the maxillary bones. This method is, I believe, the most universal, if any method may be considered so, for cases in which there is normal occlusion, or approximately so. It is unnecessary to describe the method of using the Angle bands for fracture, as no doubt the majority are familiar with it. In my experience it is the best and most easily adaptable appliance, and gives more perfect results. With its use there is nothing to interfere with occlusion, there are no cups or caps to cover the teeth, and after the teeth are drawn into position—which can be easily effected by the use of the Angle bands—there need be no further doubt of results.

One of the greatest disadvantages of the old rubber interdental splint is the resultant unhygienic condition of the mouth, which, no doubt, is true also of the use of the metal splint. This difficulty is practically overcome by the use of the Angle bands.

Dr. W. J. McKinley, Philadelphia. I would like to ask the essayist what method of treatment he employs in a case of perhaps four months' standing. Nine times out of ten, fractures occur among the poor classes, who generally are ignorant of the fact, and sometimes allow fractures to go untreated for three or four months. Does the essayist think that satisfactory results can be obtained by applying a metal splint in a fracture that has been left untreated for four months? I can see no other way out of such a difficulty except a surgical operation, and subsequent wiring together of the bone. I had the pleasure recently of speaking to Dr. Crane of Washington, on this subject, who said that in the past three years he had wired about thirty-five cases in the army hospital and in the colored hospital, using an iron wire of about No. 20 gage, and bringing the parts together by these means. He reported that every case has shown completely satisfactory results.

Dr. Dorrance said that in wiring the upper and lower teeth together, the wires would loosen at the necks of the teeth and would likely cause infection and trouble at the gingival margins. If these wires are correctly adapted, they will not cause trouble or infection, because they are not supposed to extend underneath the gum margins, but to pass over the crown below the gingival margin. I consider this one of the simplest methods of wiring fractures, and believe that a fracture should be repaired at the first sitting, after diagnosis has been made, an X ray obtained, and the parts have been put in a thoroughly aseptic condition. By this method the fractured parts can be placed in accurate position in less than half an hour, by wiring four teeth on each side together in accurate position. In this way perfect articulation and adaptation is secured. The patient can be fed on liquids, either sucking them through the dental interstices or through an edentulous space, if a tooth has been previously extracted.

In the essayist's case, in which there was a fracture in the canine region, in my opinion the canine was involved, and I would consider that the pulp of that tooth was injured and would die and produce an abscess were the tooth allowed to remain in the mouth. I would like to ask the essayist whether that case was one that occurred in his practice.

Dr. Ivy (closing the discussion). I am very much pleased indeed that the paper excited such an interesting discussion.

Dr. Russell's plan of wiring the teeth with ligatures temporarily, until a splint has been made, I think to be an excellent one. As to infection, if the mouth is

thoroughly cleansed beforehand, the possibility of infection is not so great, in my opinion, if the jaw is fixed by the splint, as if treated without fixation. Imperfect fixation in a great many cases leads to infection, and if infection occur at all, it can be treated as well with the splint in place as without it. We can get at the jaw below the splint externally and make drainage, if necessary, leaving the splint in place. As to ankylosis occurring as the result of the use of splints, it is a generally established surgical principle that in all fractures, where the joint is not complicated by the fracture, fixation alone never causes ankylosis by application of splints, and when the splints are taken off, the parts may be stiff temporarily, but always become normal again. That applies to all joints in the body, I believe. Of course, in a complicated fracture or when infectious matter is running into the joint, ankylosis is liable to occur following the injury.

I do not think Dr. Biddle had heard the entire paper, because I mentioned the Angle bands, and indicated cases in which they could be used with success, namely, in fractures where there is no great displacement and where good teeth remain in both jaws. I might add that these bands, which are now known as Angle bands, were described and illustrated in Coleman's "Manual of Dental Surgery and Pathology," edited by Dr. Stellwagen in 1882, long before Dr. Angle used them. In this book, credit for the idea is given to Dr. M. H. Cryer.

In answer to Dr. McKinley, I would say that I have seen a great many cases of old fractures treated by these splints after several months have elapsed. In cases where there has been mal-union, of course, we cannot correct the deformity with the splint, because we cannot get the bone in proper position, but in cases where there is non-union we can get union by applying the splint sometimes several months after the fracture has occurred. The case referred to by Dr. McKinley was not a practical one, but we have had a great many practical cases just like that shown in the slide, where the root of a tooth was involved, and in these fractures the nerve supply to the teeth is always involved. Abscesses do not always occur; sometimes an abscesss develops, but that is no contra-indication to the use of the splint. If an abscess occurs, it has to be opened, that is all, and union of the fragments may be delayed sometimes, but they usually unite afterward with good results. Often, if the root is exposed in the fracture, no ill results follow.

(To be continued.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Annual Meeting, held December 16, 1913.

THE annual meeting of the Academy of Stomatology was called to order by the president, Dr. Joseph Huggins, in the dining room of the Colonnade Hotel, at 8 o'clock, on Tuesday, December 16, 1913.

Dr. GASKILL reported for the Council the following officers elected for the ensuing year:

President—J. V. Mershon.
Vice-president—J. C. Curry.
Secretary—F. R. Stathers.
Treasurer—A. E. Bassett.
Member of Council—O. G. L. Lewis.

He also reported the election to membership of Dr. R. H. Riethmüller.

Dr. Mershon took the chair, and announced as the feature of the evening a paper by Mr. W. W. ATKINSON, Philadelphia, entitled "The Vital Aspect of the Amalgam Alloy Question, and Some Practical Suggestions."

[This paper is printed in full at page 294 of the present issue of the COSMOS.]

Discussion.

Dr. E. T. DARBY, Philadelphia. I have been very much interested in Mr. Atkinson's paper—first in his definition of an amalgam. I think the terms amalgam and alloy are confounded in the mind of the dental practitioner. The essayist's definition of an amalgam is perhaps as good as any that could be given. When the Crawcours came over in 1833 with "Royal Mineral Succedaneum," their alloy consisted of silver coin filings and mercury—that was amalgam. Amalgam is one or more metals combined with mercury. An alloy is two or more metals melted together, and when combined with mercury an amalgam is formed. In 1848, when Dr. Evans of Paris introduced an amalgam of tin and cadmium, it was thought that he had revolutionized the amalgam fillings of that day, but he very soon found that the cadmium which he combined with tin and mixed with mercury not only disintegrated the dentin of the teeth, but turned the tooth yellow, and he was very quick to denounce his own child as a worthless preparation. A little later, in 1855, Dr. Elisha Townsend of this city introduced an amalgam consisting of five parts of tin and four parts of silver, expecting the fifth part of tin to burn out so as to leave equal parts of tin and silver, which was amalgamated with mercury; this was known as Townsend's Amalgam. A few years later Ambrose Lawrence introduced his amalgam, which he said was tin and silver with a percentage of copper; whatever copper it contained was the copper found in the American coin at that time. Whatever merit Lawrence's amalgam had was due to the copper present in the coin that he used. From that date onward, the experiments made by Professor Hitchcock of Harvard, the experiments of Tomes, both father and son, Mr. Fletcher, Dr. Flagg of this city, and subsequently by Dr. Black of Chicago and others, have greatly improved the alloys and amalgams that are being manufactured and used at the present time. It is said that there are over two hundred makes of amalgams in this country, and I have heard it said that out of these two hundred only four or five really have any great merit. It is undoubtedly true that the amalgams that contain a large percentage of silver are in greatest demand at the present time. Dr. Black found that amalgams with a large percentage of tin flow more readily than those in which the percentage of silver is high.

Instead of using fifty per cent. of silver and fifty per cent. of tin he increased the percentage of silver to sixty-eight, and even as high as seventy-two, with twenty-eight per cent. of tin, and an addition of copper which greatly improved the material. He also demonstrated that gold, platinum, and zinc did not improve amalgam; that one and one-half or two per cent. of zinc, while it tended to make the amalgam better in color, destroyed the edge strength and consequently detracted from its merits. The amalgams in greatest favor today have at least 72 per cent. of silver, but if 70 per cent. of silver, 25 of tin, and 5 of copper were used, I think the result would be still better.

Some years ago I experimented a good deal with amalgams, hoping to find a product that would have a large percentage of gold in it and could be worked advantageously, but I found that gold and platinum, which I used in large quantities, did not add anything to the desirable qualities of the alloy. Amalgam is at best not a very satisfactory filling material. I sometimes wish that I could say as Dr. McKellops did years ago, "Thank the Lord, I never yet introduced an amalgam filling, and I never shall use the nasty stuff as long as I live." Dr. Taft of Cincinnati boasted that he never used amalgam. It is said, however, that seventy-five per cent. of the teeth filled in this and in other countries were filled with amalgam. If it be true that so large a percentage of fillings is made of amalgam, and if we take into consideration the character of some of these amalgams, we must at once conclude that there is an awful lot of poor stuff used, for we see the results in the mouths of our patients.

It would be useless for me to say to you that there are better materials for filling teeth than amalgam; you would go on using amalgam just the same. You see in your practice fillings of amalgam doing excellent service—they are in a way satisfactory; but you see hundreds of fillings which others have inserted which do not come up to your standard of good fillings. There has been expansion or contraction; there have been, as Dr. Lawrence used to say, nasty black gutters around the fillings, which are always unsightly, and when we see these we regret having used amalgam. At the same time I believe that science has done a great deal in improving amalgams, and that great credit is due to Dr. Black for what he has done. I am strongly of the opinion, from what I have seen of Mr. Atkinson's work in this particular field, that he has given us a formula perhaps equal to the best. I have used some of the alloy made after his Ag_2SnCu formula, and have been very much pleased with the result. How I shall feel two or five years hence, I cannot say. But say what we will, and dislike as much as we do the appearance of amalgam fillings, I do not see that we can do without it. It possesses many of the desirable qualities of a filling material. It has desirable qualities that the silicates or the new synthetic enamels do not possess. It has edge strength when properly used. If we use a well-adjusted matrix in all proximo-occlusal surfaces, and then finish the fillings as perfectly as has been outlined by the essayist, very good results will be obtained with an amalgam of good quality. But the trouble is, we do not know which alloy is best. We try one and think it is best, and six months later we consider it bad, and discard it, to take up some other make, which we find also unsatisfactory. I have for several years been using an alloy that costs two or three times the price of some other alloys, and I must confess that, after two or three years, this high-priced alloy has not shown any better results than some of very much less cost. Sometimes we are disappointed in the things that promise most.

The essayist has spoken of the importance of having pure mercury. There is a great difference in mercury, and we know that the ordinary mercury of commerce is not pure, unless it be redistilled. The essayist has said that if a globule of mercury runs over a sheet of uncalendered paper without leaving any stain, it is as pure as it can probably be made. I formerly put it in dilute nitric acid for a time, poured off the acid and washed

the mercury, and the mercury thus treated became as limpid as a drop of water. The essayist has also spoken of the importance of washing amalgam in alcohol. When I was a student, my preceptor taught me to do that; I felt that it was as important as the thorough mixing of amalgam. Then somebody suggested—in 1866, I think—that the alloy be washed in sodium bicarbonate and water in the palm of the hand, rubbing it until the oxid was taken out and the mass was clean and white as silver. Some said that after washing we did not get the alcohol out of the alloy, but that is not true. Amalgam has a stronger affinity for itself than for moisture, and there is no difficulty in removing the moisture from it by kneading in white muslin. I think it is a feature of great importance that the amalgam be thoroughly washed, dried, and put into the cavity as quickly as possible.

In regard to the amount of mercury to be used in fresh-cut alloys, we must use more mercury in those that are fresh cut than in old alloys. I think that the date of making the alloy should be recorded on the bottle. Amalgam that is one year old should be handled differently from one that is freshly cut. Those who have had any experience in making amalgam know very well that a fresh-cut amalgam with a high percentage of silver seems to harden before it can be inserted into the cavity, and many of us make the mistake of not having everything ready, the matrix in position, the cavity dry, and packing the amalgam immediately after mixing. As soon as the amalgam begins to crystallize, it loses some of its desirable qualities, and too many fillings are inserted after the amalgam has commenced to set. My method is to have the cavity prepared and dry, and the matrix in place, while my assistant is working the amalgam in the mortar until the moment when I am ready to insert it into the tooth. After removing the excess of mercury, she hands the amalgam to me, and I pack it into the cavity as quickly as possible. Many of the failures of amalgam filling are, in my opinion, due more to faulty manipulation than to the amalgam itself.

Dr. H. J. Gaskill, Philadelphia. I am not competent to discuss this subject, but there are several questions that I would like to ask Mr. Atkinson. One is, When a large excess of mercury is pressed from the mixed amalgam, does this mercury take out in solution certain parts of the alloy, in that way disturbing the proportions of the metals so necessary for an efficient filling? The other question is one which came up recently, though I had supposed that it had been answered satisfactorily some years ago, viz, Is it possible for an amalgam filling to have any effect in changing the action of drugs, as is claimed by homeopathists? A short time ago a patient, under treatment by a homeopath, said to me that amalgam could not be inserted into his mouth, because in his physician's opinion it interfered with the action of the medicine he was then taking. He had a son under treatment for tuberculosis, who had a large number of amalgam fillings in his mouth, and the physician treating him had ordered every one of these fillings removed and replaced by cement or gold. I would like to know whether any investigation has been made as to whether the mercury could possibly have an action which would interfere with the physiological properties of homeopathic drugs?

Dr. J. C. Curry, Philadelphia. The essayist has spoken of the oxidization of amalgam fillings. I would like to ask if that term is correct. Do they oxidize or sulfuret? My experience is that they sulfuret, I would like to have the essayist explain just what he meant. He speaks of sulfureting as being one of the faults of amalgam in the tooth, and later he speaks of oxidizing. I believe that amalgam fillings sulfuret, and the sulfureting of the alloy in a great many of the cases which Dr. Darby has spoken of, in which black gutters appear around the filling, prevents caries in these gutters. All of us are familiar with the amalgam fillings which we inserted years ago; we find gutters around these fillings, but no caries around the edges. By some chemical action of the material bacterial action has been inhibited in these places. We hesitate to remove fillings that have been in place many years; we feel that we

could put in a better-looking filling, but not one which would save the tooth better.

Dr. R. H. RIETHMÜLLER, Philadelphia. Being the baby member of the Academy, it hardly behooves me to raise my voice before this body of experts.

I have been interested in the amalgam problem for some years, having been first attracted to it by the necessity of translating Dr. Fenchel's treatises on amalgam alloys. In my opinion, amalgam is a necessity, and is every day becoming a greater necessity owing to the demands which the modern oral hygiene movement is placing upon the dentist's shoulders. The charity patient is not able to pay for the more expensive filling materials, and amalgam is probably the only material that is wholly suitable in the cases of school children. Moreover, amalgam allows better than any other permanent filling material—with the exception of cast gold, which involves other serious disadvantages—the anatomical restoration of lost portions of teeth, which, in certain dental journalistic quarters, has recently been exploited as a remarkable new discovery, although this principle of anatomic restoration is as old as the science of dentistry itself.

The essayist's suggestion that on every bottle of amalgam the formula be printed would be unsatisfactory, because the formula of an amalgam alloy will not guarantee to us its physico-chemical action. The Commission on Scientific Research of the National Dental Association has recently started an investigation into the qualities of amalgam alloys, and no doubt good results will follow this investigation. In order to obtain a satisfactory amalgam alloy, it is absolutely necessary to recognize the physico-chemical actions of its constituent metals upon each other. Our essayist tells us that his formula Ag_2SnCu has solved a great deal of this problem. I fear, however, that this is only partly true, owing to the actions of the three metals, Ag, Sn, and Cu upon one another. If we, for instance, put Ag, Sn, and Cu together, the ordinary rules of valence do not hold good. By combining these metals we may obtain any one of the following formulæ: $Ag + Sn + Cu = Ag_3Sn$, or $= Ag_2SnCu$, or $= AgSnCu_2$, or $= SnCu_3$. We may have any or all of these compounds present in the alloy, and we have no grounds to assume that two melts of any alloy are identical in physico-chemical constitution. From this it appears that the physico-chemical action of this alloy is a very variable factor, and we are never sure whether in our amalgam we have a uniform group which will act in a uniform way. Moreover, it is very difficult to know with certainty whether the metals we put into the amalgam alloy are absolutely pure, because often the slightest trace of impurity or the slightest change in the purity of the supply of the original metals will bring about a change in the physico-chemical behavior of the alloy, which, of course, complicates the matter considerably. The uniformity of an alloy must be proved by extremely delicate tests, for which the Black micrometer and dynamometer are by no means sufficient. The only way in which this uniformity of an amalgam can be proved is by the photomicrograph, and cooling-curves obtained with the thermocouple, an extremely sensitive electrical device that shows any slight molecular change that may go on in the body of the alloy. The work of McBain & Joyner* and that of Petrenko and Pushin, two Russian scientists who presented the results of their investigations before the Chemical Society of Moscow, probably represent the most advanced thought in this field.

In regard to platinum pins, which our essayist suggests for the purpose of anchorage of amalgam fillings, there seems a danger of producing a galvanic action which may alter the physico-chemical behavior of the amalgam and affect the durability of the filling by electrolysis. The use of a platinum pin in this way should cause us much greater apprehension than the introduction of zinc into the alloy itself, where the probability of its causing deterioration by galvanic action is small. For this reason it seems that no pin should ever be introduced into an amalgam filling, because its com-

* See "Amalgams Containing Tin, Silver, and Mercury," by J. W. McBain and R. A. Joyner, DENTAL COSMOS, June 1912, p. 641.

position may be changed, no matter of what material the pin be made. Possibly the difficulty of anchorage in large fillings could be overcome by obtaining retention in the canals themselves, thus obviating the necessity of inserting pins that will destroy the physico-chemical equilibrium of the amalgam.

Even if we should succeed in obtaining a perfectly scientific formula for an amalgam, the mixing process will be an empirical one at best, unless we employ a suitable mixing apparatus for accurately weighing out the proper proportions of alloy and mercury. These proportions should be altered according to the age of the alloy, which, as the essayist has pointed out, is a very important factor. There is no doubt that the introduction of perspiration, epidermal cells, bacteria, and dirt will affect the future behavior of the alloy to some extent. For the same reason, I believe that the chamois-skin is to be entirely condemned, because in time it collects not only bacteria and dirt of all sorts, but particles of set amalgam and a lot of mercury which, in turn, may attract sulfur, and in that way impair the purity of the amalgam. The best material for squeezing out the excess of mercury is probably one of the little aseptic muslin doilies furnished to us under the sign of the Red Cross, which after being used once, can be thrown away without expense.

Another danger which our essayist has pointed out is the introduction of particles of mercury into the skin and their subsequent absorption by the system. In cases of idiosyncrasy, especially, this may lead to really serious results. A great many cases have been reported in which dentists who were in the habit of mixing amalgam in the palms of their hands have exhibited symptoms of mercurial stomatitis, extensive salivation, and serious dermatitis with crippling results. It is therefore not only for the sake of cleanliness but for the prevention of one of the many occupational diseases to which the dentist is subject,* and toward which he seems to be so sublimely indifferent, that the slovenly method of mixing amalgam in the hand must be discarded.

The effect of the mercury contained in amalgam fillings upon their "high-potency" remedies has been greatly exaggerated by homeopathists. As soon as the amalgam has set, there can be no further action of the mercury upon extraneous substances, the alloy and the mercury having formed a unit. In a paper read before the Texas State Dental Society in 1908, entitled "The Homeopathic Theory Concerning Amalgam," Dr. B. F. Thielen reviewed the literature on this mooted question, with the conclusion that—"The homeopathic theory seems to have no foundation in fact; it is not supported either by scientific investigation or chemical experimentation or observation, but is merely a hobby of some homeopaths, and should not be encouraged by the dental profession. On the other hand, the dentist who ruthlessly removes good and serviceable amalgam fillings without protest, should be condemned."

Gentlemen, I am afraid I have already taken too much of your time. I thank you very kindly for your attention; but as I am here to learn, I would rather be a listener than a speaker.

Dr. Foster Jack, Philadelphia. A number of times we have read suggestions that, instead of manipulating the amalgam in the palm of the hand, the finger-stall be used, and the question comes to my mind, Would not the sulfur contained in the finger-stall be harmful to the amalgam?

Dr. Curry. I understood the essayist to say that amalgam should not be packed into the cavity with great force, because in the ratio that force is used there is a tendency of the amalgam to expand in order to release itself. I have always packed amalgam with as much force as was consistent with the patient's and my own comfort, and, if I am in error, I would like to know it.

Dr. Riethmüller. I would like to ask what effect it will have upon the setting qualities of an amalgam filling if, instead of using the essayist's hint about employing tin foil or a stick of tin in finishing and contouring the amalgam filling and removing the excess of

* See "The Occupational Diseases of Dentistry," Dental Cosmos, January 1914, p. 123.

mercury, cotton wound tightly around the pliers is dipped in water or alcohol, and the filling is finished by this primitive but handy accessory. I have found that by these means a smooth surface is obtained, which needs very little polishing when the patient returns for the second visit. Yet I have always questioned whether this procedure was good practice, as it may interfere with the setting qualities of the amalgam.

Mr. Atkinson (closing the discussion). I feel very grateful to Dr. Darby for his kind words in opening the discussion of my paper. He has thrown a light upon the history of amalgam alloy that, for me at least, had not shone before. Although I had known of the preparation of coin silver and tin which he mentioned, I did not know its origin, nor that it had been brought over from France under a proprietary name.

I noted carefully Dr. Darby's statements regarding the uncertainty of amalgam fillings due to the difference in their qualities of expansion and contraction, and I believe that, more than the amalgam itself, the personal factor is responsible for that uncertainty.

Dr. Darby states that an alloy containing approximately 70 per cent. of silver, 5 of copper, and 25 of tin should prove to be the best alloy, but, as he has said this in the face of his expressed belief in Ag_2SnCu, I do not think that he has stopped to figure out the percentages of the latter. Ag_2SnCu contains 54 parts silver, 16 of copper and 30 minus per cent. of tin. I appreciate the fact that with this apparently high percentage of copper, one would expect the material to turn black in the mouth, but this is contrary to our experience.

Dr. Gaskill asks whether a great excess of mercury expressed from the amalgam carries with it an appreciable quantity of alloy. That question can be included in answering Dr. Riethmüller's statement that chamois should not be used for expressing excess mercury, because it collects germs, unused alloy, and other detritus, and that the aseptic napkin is better for that purpose. I should say that, through the coarse weave of an aseptic napkin, it is quite possible to express portions of alloy and so upset the balance, whereas it is improbable that any appreciable amount of alloy will go through chamois-skin. As chamois is quite cheap, it may be cut into small pieces, used, and then discarded.

Dr. Curry asks, Does an amalgam filling oxidize in the mouth? The action of the oral fluids on the filling consists in the formation of sulfates, carbonates, oxids, and chlorids. There are several reactions that take place, according to the material. Zinc is particularly sensitive to these reactions. If one wishes to get a zinc reaction, a very simple experiment suffices. The ends of a piece of copper and a piece of zinc are pressed upon the moistened tip of the tongue, and we have there a galvanic battery in which we can plainly feel a current generated. With these two metals in the mouth we have a galvanic pair, with the oral fluids acting as an electrolyte.

Answering Dr. Curry's other question, I have not said that great force should not be used in the introduction of amalgam fillings, but I made the statement that the expansion of an amalgam filling could be in part controlled by the amount of force exerted in packing it into the tooth cavity; and that the subsequent release of the mechanical strain from the compression would cause expansion of the filling. Therefore, if we wish a filling to expand beyond its normal point, strong compression of the amalgam will often accomplish this, which fact probably accounts for the great number of fillings made from the older alloys which have stood the test and have been in the mouth for so many years. I have had a filling in my lower left first molar for thirty years; it was made from Welch's silver-tin amalgam, and it has, so far, done good service. These old alloys were not considered scientific, and yet they have done good work because good dentists inserted them.

Dr. Riethmüller takes the question up from a different standpoint. He says that amalgam is a necessity in dental work, and that his interest was enlisted through his work of translating the

articles of Dr. Ad. Fenchel. I have read these papers and have been very much interested, yet despite the scientific knowledge which Dr. Fenchel undoubtedly possesses, he has evolved an alloy which is not a chemical alloy, but an alloy in atomic balance, AgSn. We would have therein the intermetallic compound Ag_3Sn surrounded by a eutectic composed of a small portion of silver and a large portion of free tin. The experiments of McBain and Joyner, to which Dr. Riethmüller referred, fully prove this. In McBain and Joyner's paper that point is illustrated with photomicrographs. According to McCauley,* that particular compound of silver and tin (AgSn) was deficient in strength and had too much flow. That Dr. Fenchel should have missed the obvious formula Ag_3Sn is very strange to me; it is incomprehensible, considering the facts established by Dr. Black.

Dr. Riethmüller states that the formula will not guarantee the physicochemical action of an alloy; that several combinations are possible when we compound Ag_2SnCu. That is all very true, but we have certain established compounds so far as the investigations of leading scientists go. Dr. Desch in his "Metallography" states that, from a comparatively small number of intermetallic compounds, we have progressed to a knowledge of 109, and that is within only a few years. In these are included the formulas Ag_3Sn and Cu_3Sn. Ag_2SnCu is an adaptation of the last two compounds by the substitution of an atom of copper for one of the silver atoms.

If you are interested in the theory of the compound Ag_2SnCu, I shall be glad to read it to you:

Theory of Ag_2SnCu.

From the premise that from the observed properties of volume increase, tooth conservation, and great strength contributed by Cu to its alloys with AgSn, it is reasoned that Cu is the logical modificant of such alloys. So far as is now known, Cu forms no chemical compounds with Ag, but is miscible with it in the fluid state in all proportions; it, however, forms the compound Cu_3Sn, and Sn in turn forms with silver the compound Ag_3Sn. Sn is thus quadrivalent in each of these compounds with Cu and Ag, that is, in each of the atomic compounds noted there are three atomic portions of either of the combining metals to one atomic portion of Sn; therefore, in seeking an alloy of these metals in the atomic ratio, it would seem that one would be restricted to the binary compounds Ag_3Sn, or Cu_3Sn. An analysis of their properties shows, however, that they fall short of the requirements for dental amalgam alloys. The effort is, then, to secure a compound in the ternary series AgCuSn which shall meet the physical requirements. Therefore there was substituted for one atom of Ag_3 one atom of Cu, thus securing the property of prompt crystallization which is conferred by Ag, the properties of expansion and rigidity which are conferred by Cu, and also the satisfaction of the valence of Sn for Cu or Ag, hence the formula Ag_2SnCu. It might be argued that the atomic weights of Ag and Cu are so different that the Sn could not be satisfied with the subsitution of the relatively small amount of Cu, but mere difference in weight is not a factor in atomic compounds—for example, the halogen chlorin (atomic weight 35.5) forms with Ag the compound AgCl, where the proportion is, by specific weight, 107.93 to 35.5, and with copper the compound CuCl, with the proportion 63.6 to 35.5. Here we have the constant weight 35.5 of the chlorin as against variations in the combining metals ranging from 107.93 down to 63.6.

If the theory so evolved were not correct, or sustained by facts, Ag_2SnCu would be a bad product, but Ag_2SnCu has fully substantiated the correctness of its theory by the certainty of its results in practice. As to the research work needed for the establishment of the formula, that part of it has been going on, and, when it is completed, I shall be only too glad to give out my results with photomicrographs and everything covering the physical properties of the material itself. But that requires time, and I shall have to have access to apparatus that at the present time I cannot reach. You may be sure, however, that all facts in connection with Ag_2SnCu, scientific, practical, and technical, shall be given freely to the dental profession.

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* See DENTAL COSMOS for February 1912, p. 174; also January 1913, p. 16.

Dr. Riethmüller spoke of the possibility of platinum posts upsetting the physico-chemical equilibrium of an amalgam, and inferred that the retention of large fillings had best be secured by amalgam; but as amalgam is rather weak for that purpose, I think that we had better accept the platinum as the lesser of two evils.

Dr. Jack asked whether finger-stalls that contain sulfur are harmful. Without doubt they are harmful; the sulfur would undoubtedly be mixed with the filling, and at some time or other cause trouble.

Dr. Riethmüller asked what would be the effect of finishing a filling with cotton dipped in alcohol, or whether I thought this would interfere with the setting qualities of the filling. It would not interfere with the crystallization, but in wiping the filling toward the edges of the cavity it is likely that we may press an excess of mercury to the edges and so make the edges weak, unless the excess mercury is subsequently absorbed by tin foil.

I hope that I have covered all the questions raised in connection with my paper, and I thank you for your courtesy and attention.

The society then adjourned.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Annual Meeting at The Hague, August 27, 28, and 29, 1913.

[Report furnished by courtesy of the *British Dental Journal.*]

(Continued from page 77.)

The President said the only country which had so far carried out the recently made request of the Committee of Organization was America, which had notified through Dr. Burton Lee Thorpe the appointment of one hon. president for each section of the congress—ten in all—and had selected Dr. Edward C. Kirk to deliver the American address at the general session of the congress; and Dr. H. J. Burkhart the speech on behalf of the American colleagues at the opening meeting. They were expecting to hear soon from France, Germany, and other countries.

Dr. Brophy said he was chairman of the American subcommittee which was to make recommendations for the sections, but until that subcommittee met he hesitated to mention any names for reporters or introducers of subjects for debate.

Mr. Mummery pointed out that these would only be suggestions, and he did not see that Dr. Brophy incurred any particular responsibility in mentioning names.

Dr. Schaeffer-Stuckert asked in which section of the congress came Conservative Dentistry.

The President: In Section III—viz, Dental Surgery and Therapeutics.

Mr. Brooks (general secretary of the congress) said that, understanding they would adjourn until Friday afternoon, he would at that time submit to the Council all the subjects proposed for reports in three languages.

This was agreed to. [On Friday afternoon the subjects for debate in the ten sections of the 1914 Congress were considered, and many names were suggested as reporters or debaters.]

Dr. Brophy's Acknowledgment.

Dr. BROPHY: I desire, in a more public way than opportunity has hitherto offered, to express my appreciation of the action taken by my honored colleagues in the F. D. I. on the occasion of the banquet which my friends saw fit to give me under the auspices of the Chicago Dental Society. Of all marks of appreciation of what I may have done in my life in and for the profession, none has touched me more deeply than the beautiful illuminated address presented me by the officers of the F. D. I. What little I have been able to do for the cause of the F. D. I. has been done with all my heart and mind, and I can truly say that I have worked for it in its most trying hours, and when it almost seemed to be hanging by a thread I have been loyal to it. I regard that testimonial, so beautifully expressed, as not so much for what I have accomplished, but rather that I have faithfully tried to do my best to help along the work of the profession. From the depths of my heart I thank you.

Spanish as an Official Language.

Dr. AGUILAR asked that Spanish should be an official language of the 1914 Congress, as had been the case in all previous congresses. This point had really been decided before in London in 1911, and he was much surprised to see that this had been altered.

The PRESIDENT. The rules of the F. D. I. do not bind the Committee of Organization of the congress.

Dr. AGUILAR could not agree with that. Moreover, the rules of the Miller prize were printed in Spanish. He wished to emphasize the fact that the Spanish-speaking peoples numbered eighty millions, including Spain, Argentine, Cuba, Chile, Peru, Venezuela. Further, they were the first nations to send official representatives to the F. D. I., and Spanish dental schools and journals were much more numerous than French. He hoped it would be decided, as before, that Spanish should be one of their official languages.

Dr. GODON supported the proposition.

The PRESIDENT. When you put it to me as a binding obligation, I do not share your opinion, though I quite recognize the strength of your able arguments. I will certainly convey to the Committee of Organization what Dr. Aguilar has said, in the hope that they may see their way to recognizing Spanish. The only difficulty is that of expense.

Dr. AGUILAR thanked the president, but urged that he had right on his side, as the question had been decided before.

Dr. SCHAEFFER-STUCKERT. We had a similar discussion before the Berlin Congress, where Spanish was an official language, and we printed the remarks of the Spanish delegates in their own language.

Dr. AGUILAR moved that in the opinion of the F. D. I. Spanish be again one of the official languages at the next congress.

Dr. SUBIRANA seconded and Dr. HUET supported.

This was carried, and Mr. Paterson undertook to inform the Organization Committee.

The Treasurer's Report.

Mr. HARRISON reported that the Auditors had examined the Hon. Treasurer's accounts and balance sheet and found them correct. A number of subscriptions were in arrears—one delegate was six years, and others five and three years in arrears. The question of altering the rules to deal with this should be considered. They also suggested that national associations should make greater efforts to increase the membership.

On the motion of the PRESIDENT, the report of the Auditors was received and adopted, with hearty thanks to Dr. Rosenthal.

The summary of the Treasurer's accounts is as follows:

Balance.	Frs.
Recettes	5,689.60
Dépenses	4,037.65
	1,651.95

Avoir de la F. D. I. au 1er Août, 1913.

		Frs.
En banque au 1er Août, 1912		6,464.15
Balance au 1er Août, 1913		1,651.95
		8,116.10
Intérêts	54.30	
Frais de banque	3.20	
		51.10
		8,167.20

HYGIENE COMMISSION.

The Hygiene Commission met on August 28th. Prof. Dr. E. JESSEN, president, took the chair, and was supported by Dr. Van der Hoeven, Professor Christensen, Mr. Lenhardtson, and Dr. Jenkins.

Prof. Dr. JESSEN. Permit me to offer you a hearty greeting to our session this year in The Hague. I have special pleasure in welcoming our first president, Dr. Jenkins. At last year's meeting in Stockholm, I had the honor to explain briefly the task and aims of our International Hygiene Commission, and yesterday I gave an outline of the progress made by our movement in different countries. The particulars will be given to you in the detailed report by our secretary, Mr. A. Lenhardtson. Today I must limit myself to acquainting you with a few personal matters. We had the pleasure of being able to nominate our honored friend, Dr. T. W. Brophy, in Chicago, as hon. president of our commission on the occasion of the festivity which his American colleagues arranged in his honor on February 1 of this year. We should like in this connection to express our gratitude for the active interest which Dr. Brophy has shown from the first in our efforts, and our hope that we may have his valuable support for many years to come.

I have further to announce that Mr. Sedley Taylor, Fellow of Trinity College, and Mr. Brooks, editor of the *Cambridge Daily News,* have been elected hon. members of our commission. Both gentlemen have, together with our hon. president, Dr. Cunningham, done much for the school dental clinic at Cambridge, and have also as laymen shown the greatest interest in our labors. Proposals for other nominations are reserved for this meeting's program.

I have a sad duty to perform in announcing the death of a pioneer in dental hygiene, Prof. Dr. Haderup of Copenhagen, whose long illness unfortunately prevented his active participation in the Berlin Congress, and did not permit him to enjoy the fruit of his energy and zeal. We shall ever honor his memory as that of a charming and inspiring colleague in our profession.

I now open the proceedings of today, and call upon Mr. Lenhardtson for his report.

Secretary's Report.

Mr. ALBIN LENHARDTSON reported as follows: The past year has been characterized by increasing appreciation by public authorities of the importance of dental hygiene. Now that the interest is awakened, I believe that we must earnestly endeavor to arrive at a solution of many difficult questions concerning school and army dental clinics. Public authorities may soon ask us for a definite reply on many points in connection with the management and organization of clinics, the salaries to be paid, the question of free treatment, the employment of whole-time dentists, etc. There are a number of such important matters to which we have not yet given the necessary consideration, and which should be thoroughly discussed before the dental hygiene movement has taken definite form.

As to the progress during the past year, I have received more or less detailed reports from America, England, Austria, Belgium, Finland, France, Holland, Italy, Luxemburg, Norway, Switzerland, and Sweden. I am anxious to make the Hygiene Commission of the F. D. I. a central bureau for all information on the subject, as was proposed at the Berlin Congress.

In Germany there are now more than 200 school dental clinics. Thanks to the efforts of Professor Walkhoff, much activity is being displayed in Bavaria. Professor Kirschner, with whom I had a conference last autumn, showed warm interest in dental hygiene propaganda. In my opinion, it is of great moment

that the German National Committee for Dental Treatment has succeeded in interesting the higher school authorities in the movement.

In America, mainly owing to the self-denying labors of Dr. W. G. Ebersole, an energetic campaign has been carried on. Concerning New York city and state, Dr. Wheeler reports: Four lecturers on oral hygiene have been appointed in the state department of Health, the organizer giving his whole time to this work and receiving $3000 a year salary. This is due to Dr. W. A. White of Phelps, N. Y. The city Health department has appointed ten dentists at a salary of $1200 a year each for the treatment of school children, and in the infectious diseases department two dentists have been appointed at the same salary to attend to tubercular patients and supply them with artificial dentures when required. At the International Congress of Hygiene and Demography, held in Washington in September 1912, papers were read by Dr. H. Cohn (Berlin), Dr. S. A. Knop (New York), Dr. W. G. Ebersole (Cleveland) and Dr W. H. Potter (Boston), on the dental treatment of school children, and this subject was also illustrated by models and diagrams in the congress exhibition. In the United States, as in England, there exists no uniform control or organization of dental clinics, which are financed in different ways by the state or the municipality or by voluntary subscriptions. It is, of course, gratifying to see public spirit and generosity shown in this way.

In Great Britain, thanks to the grant of £60,000 from the national Exchequer to the Board of Education for medical and dental treatment in the elementary schools, the local education authorities have been active in promoting schemes for dental clinics, in which whole-time or part-time dentists are employed. In London a part-time service is generally adopted, the remuneration being at the rate of £50 a year for each officer working one half-day per week; each dentist is expected to deal with ten new cases (on the average) each half-day of two and a half hours. In London there are now thirteen dental treatment centers, and by the end of this year there will be twenty. The British Dental Association has passed a resolution recommending that the minimum salary of whole-time school dentists should be £250 per annum at the commencement. In the provinces, many education committees have begun or are contemplating dental clinics. For the county of Montgomery (Wales) two whole-time dentists will be appointed, one for the urban and one for the rural districts of the county, at a salary of £250 per annum each, with traveling and out-of-pocket expenses. The rural dentist will travel from school to school in a caravan fitted with full dental surgery equipment. Parents are to pay 6d. per child treated per year toward the cost, but necessitous cases will be free. The local member of Parliament has offered £250 toward the cost of this scheme, and the Board of Education grant will be about 50 per cent. The Dorset county authority has appointed a lady dentist at a salary of £250 for whole-time service in the schools. The borough of Cambridge has appointed a second whole-time school dentist. In Belfast (Ireland) sixteen dentists have given their services in rotation free to the school dental clinic established there this April. Dr. A. Newsholme, C.B., chief medical officer to the Local Government Board, recently stated: "We must press for treatment as well as for inspection—there is no radical distinction between prevention and cure. The work of school dental surgeons forms an important part of the work of the public health service, the importance of which will be realized more and more as time goes on." Sir George Newman, the chief medical officer to the Board of Education, gives dental treatment a prominent place in his annual report, and there can be no doubt that steady progress is being made.

In Austria the Society for Promoting School Dental Treatment has a membership of 1100, and has succeeded in interesting many influential persons, especially teachers. A striking proof of this is the establishment of a dental clinic in the training college at Troppau,

and it is intended to do the same in other seminaries. This is an excellent way of educating young teachers in oral hygiene. During the past year a second school dental clinic has been opened in Vienna, and also one in the Kindersheim. The society, which receives an annual subsidy of 6888 kronen from the state and the municipality, bears most of the expense of these clinics. As more funds are required, the society has obtained permission to hold a lottery for its own benefit.

In Belgium, the larger cities, and especially Brussels, have organized dental treatment in the schools, but this is only limited to inspection and extraction of teeth. A similar procedure has been adopted for the army. However, the attention of the authorities has been directed to the importance of the subject, and one hopes soon for better results.

In France, thanks to the efforts of the French National Committee, free dental treatment has been provided for the communal schools of the eighth arrondissement in Paris. Four dentists give their services every Thursday morning in a dispensary lent by l'Assistance Publique de Paris. The children present a chart, which is a copy of that drawn up by the Dental School of Paris and adopted by the Minister of Public Instruction in his circular of March 1908. After inspection, the dentist records the state of the child's teeth, and urgent operations are performed with the parent's consent. Similar dispensaries are contemplated in other arrondissements. It is only right to say that this experiment is due mainly to Dr. Godon, Maire-adjoint of the eighth arrondissement. M. Raymond Lemière, secretary of the committee, has delivered lectures before the Association de la Croix Rouge. The president of the committee, M. Maurice Roy, has with its sanction sent to the Minister for War a report on the improvements required in the army dental service established by the minister's circular of October 1907. The committee has also forwarded to the chambers of commerce and industry a circular urging the importance of dental hygiene from an economic and social standpoint, and quoting Dr. Jessen's speech at Stockholm.

In Finland, the Society for the Promotion of Oral Hygiene has distributed to 90,000 school children concise instructions for the care of the teeth. The city of Helsingfors contemplates establishing a school clinic.

In Holland, Dr. Van der Hoeven reports that nothing particular has been done during the past year.

In Italy, Dr. Guerini reports nothing done.

In Luxemburg, the State Hospital provides dental treatment for children.

In Norway, the Norwegian Society has lately given chief attention to propaganda work. Owing to the scattered population, a scheme for traveling dental clinics is being drawn up. There are school dental clinics in ten towns.

From Switzerland, Dr. Steiger reports on the efficiency of the clinic in Lucerne.

In Sweden, we have now about forty dental clinics in schools and educational institutions. The authorities in Stockholm and Gothenburg have decided on systematic conservative dentistry for all primary school children. The interest of the authorities in this question has increased to a marked degree, and a striking proof of this was given in the debate on this subject in Parliament this year. As I previously reported, the Swedish National Association for the Promotion of Oral Hygiene and the Swedish Dental Federation applied to the government to appoint a commission to consider the organization of the public dental service. In spite of the opposition of the Royal Medical Board, the government were prepared to appoint a commission last autumn, but some delay occurred. In Parliament the matter was referred to a committee, and, in conformity with its decision, the Chamber requested the government to ascertain and report how effective dental treatment can best be organized for schools. Accordingly the Home Minister conferred with me as to the inquiry, and also stated that the time had arrived for a dentist to be associated with the Royal Medical Board. Consequently, one must admit that the hostility of the medical powers

has brought good results. In the proposed curriculum for training colleges and schools, instruction in oral hygiene is to be included.

Dr. Jessen then nominated the following members of the Hygiene Commission:

Honorary president—Dr. Truman W. Brophy, Chicago.

Honorary members—Mr. Sedley Taylor, Fellow of Trinity College, Cambridge; Mr. Brooks, editor of *Cambridge Daily News.*

Members—Zahnarzt Hauptmeyer, Direktor der Kruppschen Zahnklinik, Essen a/d Ruhr; Dr. Friedemann, Direktor der städt. Schulzahnklinik, Duisburg; Hofrat Prof. Dr. Michel, Direktor des zahnärztl. Univ. Instituts, Würzburg; Dr. med. Kehr, Direktor der Schulzahnklinik, Düsseldorf; Dr. Robert L. Ebert, Rua Gonçalves Dias 67, Rio de Janeiro; Zahnarzt Neuhaus, D.D.S., Archimedesstr., The Hague; Von der Linde G. W., Eekwal, Zwolle; A. van Geldere, Rustenburg 109, Zaandam; J. E. de Vries, Frederiksplein 39, Amsterdam; M. Kiaer, Svendborg, Denmark; G. O. Whitaker, Manchester; W. Parker Harrison, Brighton.

Russisches Landescomitee—Dr. J. Kowarski, president, Dolgorukowskaja 18, Moscow; Zahnarzt P. Dauge, vice-president, Archangelski Per. 7, Moscow; Zahnarzt P. Taubkin, treasurer, Stani Per., H. Pribylow, Moscow; Zahnarzt K. Günsburg, secretary, Pjatnitzkaja 20, Moscow; Zahnarzt J. Okonntschikoff, assistant secretary, Grosse Lubjanka 30, Moscow; Zahnärztin H. Nikitina, librarian, Kleine Nikitskaja 29, Moscow.

He also announced that a Public Oral Hygiene section of the Russian Dental Association had been formed, with Dr. J. Kowarski of Moscow as president, and Dr. K. Günsburg of Moscow as secretary.

Dr. Godon emphasized the great significance of the progress made in Russia, and suggested that this was an opportunity for F. D. I. propaganda in Russia.

Mr. Lenhardtson had placed on the agenda for discussion the following questions:

(1) Is the wholesale extraction of the teeth of school children to be recommended?

(2) Ought whole-day or part-day dentists to be engaged in the school clinics?

(3) The salary of the school dentist.

(4) Ought the treatment in the school clinics to be gratis or not?

He said they must face the question of a definite plan for carrying out public dental hygiene work and for dealing with public and civic authorities in the organization of clinics.

As to wholesale extraction of teeth of school children, he noticed that Mr. J. F. Colyer and Mr. H. Lloyd-Williams, of the Royal Dental Hospital of London, had propounded the view that all teeth in a child's mouth that could not be easily filled should be extracted, and this had met with some acceptance in England. Their idea seemed to be that the most important thing was to remove septic conditions. He confessed himself to be rather a skeptic on the question, as he did not think these gentlemen had produced sufficient evidence to show that the occlusion of the subsequent permanent teeth would not be affected. At Stockholm they tried to save the teeth, even if considerably damaged. It would be particularly interesting to have the opinion of English school dentists on this question.

He was in favor of part-time school dentists, as they should be men of experience and tact, able to work rapidly and also having an aptitude for statistics. The public authorities must pay them well, as the work was extremely hard and trying, and the community would gain in the long run. Looking at the matter from a professional standpoint, he thought dentists would prefer part service with its liberty to practice privately.

In many countries dentists had done much of this work gratis, and this of course had contributed to raising the social status of the profession. But, after all, school dental hygiene was not a philanthropic, but a social and economic question. What was a just remuneration? It was difficult to fix an

international standard for this. They must not get a "proletariat" in their profession, as was the tendency in Germany with the workmen's insurance and sickness societies. The Swedish Dental Society had fixed the remuneration at a minimum of 5 kroner (5s. 6d.) per hour with a sliding scale, but after a few years school dentists would be on the ordinary scale of civil servants with incomes and pensions as state officials. In England, part-time dentists received £1 per half-day and whole-time dentists £250 to £300 per annum. Certainly, school dentists' work was more trying and arduous than that of school doctors, and if they proposed salaries on no less a scale, they would be on the right side. The chief thing was not to undervalue their labor and skill from the beginning.

Dr. JESSEN said he thought they were too small a body to settle such an important question, and it should be deferred till the London Congress.

Mr. LENHARDTSON said that he should like to have the matter discussed, if possible, especially in view of the forthcoming inquiry by the Royal Commission in Sweden.

M. QUINTIN favored postponement.

Uniform Treatment in School Clinics.

Dr. JESSEN proposed the following:

(1) From the age of 2½ years it is desirable that children's teeth be inspected every six months in order to treat the deciduous teeth before they ache, and to allow the children to enter public schools with healthy mouths.

(2) It is desirable for every child from the age of 2½ years to have its own tooth-brush and learn to use it morning and night, in order that children may be familiar from early age with the hygiene of the mouth.

(3) The mouths of those children who come at an older age to the school clinics should be treated as much as possible in a conservative way. Carious teeth which cannot be filled, and are sources of infection, must be extracted. Dry roots of deciduous teeth must be left in the mouth till the permanent teeth appear, in order not to impair the growth of the jaw. The decayed crowns with dry roots must be cut off and the roots filed smooth.

(4) The sixth-year molars are to be saved if possible until the age of twelve, and must only be extracted when they cannot be saved any longer or when there is not sufficient room in the mouth.

(5) Under all circumstances we must endeavor to gain the children's confidence. Children unwilling to submit to treatment must not be forced to do so, but treated kindly whenever they return. Mastication, eruption of the teeth, and general health are to be looked to in every treatment.

(6) Each child must be treated individually. The treatment must be guided by the age, the constitution, and the character of the child.

Dr. GODON said that Dr. Jessen's propositions were interesting and valuable. He thought, however, that in the present state of knowledge it was not permissible to make the recommendation in paragraph 4. He thought this should be modified or omitted.

Mr. PATERSON thought there was a danger that the Hygiene Commission, as representing the F. D. I., might take up an attitude which would not be appreciated by the great majority of the dental profession throughout the world. He urged that the propositions of Dr. Jessen and Mr. Lenhardtson should be brought before the International Dental Congress in their own names as their individual opinions, and not as the opinions of the Hygiene Commission, or of the F. D. I. He fully agreed with the remarks of Dr. Godon in reference to the extraction of the sixth-year molar.

Dr. FÖRBERG supported Mr. Paterson's view, and Dr. JESSEN agreed.

Mr. LENHARDTSON said he was of the same opinion as Mr. Paterson, but he would like the question discussed that day.

M. JEAN urged that the commission should give a clear indication of its views.

Dr. BROPHY felt bound to criticize the sentence referring to "sufficient room." There was always sufficient room in the mouth for the first molars. He thought

the reference to "wholesale extraction of teeth" should be omitted altogether. The time was past when extraction of teeth was to be tolerated except as a last resort, and the dental profession should say clearly that it was wrong. If there was dental disease, it was amenable to successful treatment in the hands of a skilled man. He regretted that the question should be raised in this way; "wholesale extraction" struck him with horror.

Mr. LENHARDTSON agreed with Dr. Brophy, but they must discuss the question, as it was raised by the teaching and practice of eminent English colleagues.

Mr. PATERSON said he demurred to the statement that the "wholesale extraction" of school children's teeth was practiced by Mr. Colyer and Mr. Lloyd-Williams. It was a very desirable question to discuss in London how far extraction of deciduous or permanent teeth should be adopted, but it was useless to discuss it at that meeting. If he personally were asked, "Is wholesale extraction of the teeth of school children to be recommended?" he would answer in a word, "No!"—and he imagined that would be the answer of them all.

Dr. FÖRBERG said it was not opportune to discuss the matter fully, but he would only draw attention to the fact that advocates of extraction had forgotten that their duty was to promote the advancement of hygiene and prophylaxis. He thought they ought to work in such a direction that the forceps might be ultimately laid aside as a more or less antiquated instrument. That was the true aim of dental hygiene.

Dr. VAN DER HOEVEN said the question depended upon the local conditions. Where there was only one dentist to deal with a great number of suffering children, extraction was the only practical method of relieving pain and giving a clean mouth. Though they as dentists might prefer to treat such cases by conservative methods, there was not always the time or the money available—as every country had not a Forsyth Institute. In Holland they had not yet succeeded in establishing a school clinic in any city.

Dr. GUERINI considered it was best to teach everyone that all teeth must be preserved, especially the molars.

It was agreed by Dr. JESSEN and Mr. LENHARDTSON to withdraw their propositions and to bring them forward personally at London.

Reports of National Committees.

Dr. JESSEN announced that a telegram of greeting had been sent by Dr. Gabriel Wolf of Vienna, who also sent the second annual report of the Austrian Society for Promoting School Dental Treatment.

He had also received a report from Russia, which would be printed in the *Archiv der Mund-Hygiene.*

Dr. ROSENTHAL said the question of school dental treatment had been discussed by the Belgian Dental Federation, and on the initiative of Dr. Pitot a resolution was passed in favor of the organization of children's clinics. They also had a congress at the Ghent Exhibition, when an excellent report was given by Dr. G. Fay, and he was asked to bring it before the Hygiene Commission.

M. FRANCIS JEAN, president of the French Association of Dental Hygiene. Our international meetings, though having only a consultative *rôle,* possess, nevertheless, a considerable interest in the questions discussed, the ideas exchanged, and the proposals brought forward. It is clear that efforts must be made to unify the methods appropriate for popularly enforcing the necessity of dental hygiene; but it is also clear that we must not wait for this dream to be realized before taking action. The complexity of this question of unification makes its solution perhaps remote and certainly difficult, because we have to reckon with the mentality of people, and to make the best of the resources available. By resources I mean administrative, technical and material co-operation. However this may be, the duty of societies affiliated with the International Commission of Hygiene is to bring before it the results of their labors and projects. This is the duty entrusted to me today on behalf of the French Association of Dental Hygiene. Last year, to our regret, it was impossible to attend the Stockholm meeting, and we prepared

for this commission a report on the present position of dental hygiene in France.

To attain practical results, we have thought it best to adopt the following method of working:

(1) Public and school lectures.
(2) Wall charts or pictures.
(3) School and army clinics.

Our attention was, accordingly, first directed to lectures intended to interest the members of the teaching profession, their scholars, and the public in dental hygiene. Such a task, however, involves a most complex, delicate, and difficult question. The matter and manner of these lectures must, in fact, vary according to the audience for which they are intended, and in every case the abolition of popular prejudices and of quackery constitutes a considerable part of our endeavors.

The wall chart or diagram strikes the mind through the eye, and the notes accompanying it assist the instructor in talking about the teeth under conditions likely to drive home the necessity of dental inspection and treatment, without which asepsis of the mouth cannot be brought about. Besides, the permanent display of the picture fills in what the child has not been able to grasp by oral teaching, and constitutes, so to speak, a perpetual lecture. It is because of the unquestionable value of pictures that all lectures should be accompanied by lantern slides. Schools are very numerous, and if all cannot be favored with lectures, each can possess a wall chart that can be used as the master judges best.

These two methods of propaganda lead the public necessarily to recognize how essential it is that school clinics be established in order to be able to put into practice the advice given in the various forms. In order that these clinics may be most useful in diminishing the detriment which some of our young *confrères* may fear—wrongly, from our point of view—at the beginning of their career, it is essential that they should only be established in populous and poor districts. It is, for instance, very easy to organize a school clinic in a well-to-do district; on the other hand, it is much more difficult to do so in a poor district, though obviously more useful. And, as soon as we possess school clinics, in addition to the inspections, consultations, and urgent operations that will have to be done there, it will be expedient to institute periodical statistics, which should be recast, compared, and published every two or three years.

With this plan of operations we have this year arrived at very satisfactory results. Our lectures have had a most encouraging reception in the primary and normal schools. The attendance in the primary schools comprised not less than 250 persons accompanying the children. In the normal schools it is always more limited, as the audience is composed only of pupils and future teachers. We have a wall chart intended solely for popular instruction, and not merely for the dentist, the doctor, or the student. Its place is indicated in all clinics and schools. This year the school clinic will have begun in France its beneficent career.

This statement has appeared to us to be most practical. We submit it for your consideration and we also hand to the president a specimen of our work, comprising a wall picture and explanatory notices. I take advantage of this opportunity to congratulate the French National Committee on the establishment of a school clinic, and to request Dr. Godon, as deputy mayor of the 8th arrondissement of Paris, to present on our behalf the wall chart exhibited to the F. D. I., to the director of the clinic.

Dr. Godon thanked M. Jean for presenting the interesting and useful wall chart "Soignez vos Dents" to the F. D. I.

Dr. G. Cunningham said he need not detain the meeting long in making his report. The annual meeting of the British Dental Association had just been held at Cambridge, where the pioneer school dental clinic in England had been so successfully established. Many other clinics had since been started. They felt the importance of keeping the salaries of the school dentists at as high a standard as possible, in order to induce skilled dentists to take a permanent

interest in the work. The borough dentist of Cambridge, Mr. W. H. Jones, in his paper "The Conquest of Caries," read before the British Dental Association meeting, was able to quote remarkable statistics showing that 72 per cent. of the school children now had permanent sound teeth, and it would probably be 84 per cent. next year. The cost of the clinic was only just over ¼d. rate in the £1. He hoped to have the privilege of reading a paper before the next congress on "Science and the Cinema." He was preparing a new film from material gathered in France, Sweden, and Holland, that would be really international, and he had another film, a French one, entitled "Les dents pour tous."

Dr. JENKINS said he had had the great advantage of seeing with what earnestness and enthusiasm the question of oral hygiene was being taken up in America, and the results already were extraordinary. Although there was as yet no completely organized national movement, this was on the way owing to the spirit of unity in which the state dental societies worked together for this great aim. The propaganda in America had been greatly assisted by the intelligent laity, who began to appreciate what oral hygiene might accomplish for the nation. The noble Forsyth Institute in Boston was an extraordinary example of what they could expect from the laity. Very great interest was taken in dental hygiene, not only in Boston but throughout the whole state of Massachusetts, as he found in attending a recent meeting of their dental society, which also discussed the practicability of making use of female dental nurses in the manipulative processes incidental to pyorrhea treatment. Some idea of the admirable work done in Massachusetts was given in an article in the *Dental Brief* for July last.

Dr. JESSEN announced that America had now 150 societies working for oral hygiene.

Dr. GUERINI stated that he had decided to make a monetary gift to the Hygiene Commission.

The session then ended.

(To be continued.)

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Devoted to the Interests of the Profession.

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PHILADELPHIA, MARCH 1914.

EDITORIAL DEPARTMENT.

THE SIXTH INTERNATIONAL DENTAL CONGRESS.

THE sixth of the organized series of dental congresses, international in scope and character, will convene in London, August 3–8, 1914, under circumstances of peculiar interest and importance to the dental profession of the world, and especially to the dental profession of the United States. First, because of its setting—in the greatest metropolis of the world and of the English-speaking people, a city whose history is synchronous with that of the Anglo-Saxon race, reaching back to a period before the Christian era. London is a treasure-house of historic wealth and association, a repository of the material records of every phase of human achievement through two millenniums of growth and activity of a people of whom we are a part, and with whom we as Americans are most immediately concerned both from the viewpoint of history and of our future race-progress as well. To the professional man who has not yet had the pleasure of visiting England,

and who has therefore yet to discover how utterly the contemplation of her antiquities, her historic relics, her treasures of art and science, can absorb his attention and command his reverential admiration, the experience of a first visit will indeed be a revelation. The Sixth Congress, besides the inducement which its scientific and social program offers, presents therefore an opportunity for an enlarging experience little short of a liberal education by reason of the fact that it is to be a London congress.

A second factor of importance to American dentists in connection with the Sixth Congress is the departure which the administration has devised in order to determine the character of the work of the congress. In previous congresses, while the divisions of the meetings have partitioned the various activities of dentistry under appropriate sectional designations, there has heretofore been no systematized directive effort to determine in advance the general nature of the scientific and literary output of the congress, other than to invite essayists who could be reasonably depended upon to present matters of professional interest and value. This lack of a directive principle in the organization of previous congresses has permitted an undue proportion of undesirable matter to become part of the program, and has consequently secured for it a permanent place in the official proceedings. The administration of the Sixth Congress has wisely taken cognizance of the unfortunate waste of time and energy that to a degree inevitably results from lack of a central *motif* in the arrangement of a congress program, and has satisfactorily solved the difficulty by arranging for a series of contributions in the form of reports each dealing with a definite phase of dental professional interest, and setting forth the results, up to date, of progress within each of the special departments to be reported upon. By this plan the proceedings of the congress will be broadly representative of the development of dental education, science, and art at the time of the holding of the congress. The principal work of the meeting will be the presentation and discussion of these formal reports, and time and energy will thus not be wasted upon comparatively irrelevant matters; moreover, the door will be closed upon the exploitation of fads and devices of the eccentric and ignorant.

But most important of all considerations in a professional sense is the bearing which the time and place of the holding of the congress will have upon the standards and position of American dental professional activities from an international point of view. We have talked so much about American dentistry, and have patted each other's backs, so to speak, so continuously about the "superiority" of some of the things we do and have been doing, that not a few of us have come to believe that it is all true, and that we have little or nothing to learn from our colleagues of other countries; indeed, it is not very difficult to find, now and then, those among us who do not seem to realize that dentistry is practiced anywhere outside the geographical confines of the United States, or even of certain individual states. These are they who most need for their own enlightenment and the general good of their profession to get out of their rut of provincialism and see for themselves what is being done in dentistry elsewhere. The London congress will be an effectual cure for both professional provincialism and individual Jack-Hornerism.

It is just the element of provincialism that among other things makes a trip to London to attend a congress seem to be an undertaking of rather huge proportions; when, however, the transportation facilities and the cost of living and time involved are fairly considered, it will be found that the outlay is no greater than that required for a reasonable vacation at home. Besides, from its returns in health, in an enlarged professional vision, in an experience of life made rich by a broader outlook and better understanding of what the other side of the professional world is doing, the opportunity takes on largely the semblance of a duty which one owes to himself as well as to his profession. Much advance in dental knowledge has been made since the previous congress in Berlin; the growth of interest in the scientific and vital side of dentistry in America has been rapid, and in Europe there has been a corresponding development of interest in technique and along the lines of ingenuity and resourcefulness with respect to operative procedures, so that we approach the holding of the London Congress with less of that difference which was formerly believed to characterize the dental professional attitude and ideals of Europe and America respectively. We may therefore expect a greater harmony of purpose and a better professional

understanding, with a consequent higher efficiency and attainment. as an outcome of the London meeting than of any that have preceded it. Everyone who can do so should take advantage of the occasion to attend the London Congress, for his own good and the good of our profession.

A DENTAL DEPARTMENT FOR SETON HOSPITAL.

We give publicity to the following circular at the request of the parties interested:

[*Circular.*]

Dear Doctor,—The Medical Board of Seton Hospital has recently established a well-equipped and well-lighted Dental Department, and desires the co-operation of one or more dental surgeons to properly develop this branch of the hospital's work. Seton Hospital is located on Spuyten Duyvil Parkway, on a plot of land twenty-eight acres in extent, has a constant population of about 480, consisting of men, women, and children, and has recently reached a teaching agreement with the medical department of Fordham University. It is also hoped that the near future will see a well-appointed and sufficiently endowed X-ray plant available.

The dental work would consist of simple fillings, treatment of teeth and abscesses, extractions, etc.

We hope for the same measure of success as has been attained in the department of orthopedics and oto-laryngology, now in an advanced state of effective organization, and feel that opportunity would be offered to observe and study many pathological conditions of the mouth and teeth, irrespective of their relation to tuberculosis, which would enable the right kind of man or men to develop one of the largest and most important dental centers in this vicinity. If you can help in this valuable and important work, by giving about three hours a week, will you kindly let us know, as applications are now under consideration? We would also appreciate the communication of the name and address of anyone who might be or become interested in this extension of our field of service.

Sincerely yours,

Committee: C. D. Van Wagenen, M.D. D. C. Martin, M.D.
M. F. Black, M.D.

Consultant: H. S. Dunning, M.D., D.D.S.

Note.—Please address all communications to C. D. Van Wagenen, M.D., 616 Madison ave., or H. S. Dunning, M.D., D.D.S., 17 E. 38th st., New York, N. Y.

Bibliographical.

The Medical and Sanitary Inspection of Schools. By S. W. Newmayer, A.B., M.D., in charge Division of Child Hygiene, Bureau of Health, Philadelphia. 12mo, pp. 318, with 71 engravings and 14 full-page plates. Cloth, $2.50 net. Philadelphia and New York: Lea & Febiger, 1913.

The propriety of systematic medical inspection of public school children including the sanitary conditions of their school and home environment has long ago passed beyond the debatable stage. Indeed, such sanitary care of the rising generation of school children has become a recognized function of the governmental care of its future citizens. Dr. Newmayer's book is an eminently practical guide for those concerned in the conduct of this class of work. Unlike other such works that we have examined, the present one contains an intelligent and systematic presentation of the subject of dental inspection and dental care of public school children, for the author has wisely depended upon the co-operation of a trained dental practitioner who is, at the same time, a specialist in the matter of the dental inspection and care of public school children, and one whose experience in the management of the pioneer municipal dental dispensary and its activities, both as related to the inspection of the mouths of public school children and the remedying of their defects, has been an extensive one. Dr. McCullough's work, which is thus utilized, has served as a stimulus and model for the development of dental inspection and treatment of school children in other municipalities, and has been so eminently successful that it may be taken as an authoritative standard. We are not prepared to pass expert judgment upon the value of the methods described with reference to sanitary and medical inspection in other directions, but from the point of view of the non-expert, and taken in connection with the evident value of the dental phase of the work, we feel safe in believing that, taken as a whole, Dr. Newmayer's book is a most excellent, trustworthy, and practical guide within the domain embraced in its title.

Dental Electro-therapeutics. By Ernest Sturridge, L.D.S.Eng., D.D.S., Fellow Royal Society of Medicine, Memb. British Dental Association, London, Eng. 12mo, pp. 318, with 154 engravings. Cloth, $2.75 net. Philadelphia and New York: Lea & Febiger, 1914.

Several works have appeared dealing with the applications of electricity to dental practice, but none heretofore published make any pretension to cover quite the same field as the volume under present consideration, in which the author lays special emphasis upon various therapeutic uses of electrical energy in connection with dental practice. While the principles of electro-physics are touched upon in so far as a knowledge of these principles is necessary to a clear understanding of their applications and utili-

zation in the various types of apparatus used in dental electro-therapy, the author presupposes upon the part of his audience an elementary knowledge of the subject of electro-physics, and subordinates that aspect of his work to the more important considerations relating to the application of the principles involved to the treatment of disease conditions. The arrangement of the work is admirable, as is also the nice adjustment of the theoretical aspect of the subject in relation to its applications to practice.

The work is an intelligent, clear, and full presentation of the essential and more important data relating to electro-therapeutics in so far as they are applicable to dental needs, and is the best and most comprehensive presentation of the subject within our knowledge. It is one of those satisfactory presentations which is as valuable for what it does not say as for what it sets forth.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Zeitschrift fuer Zahntechnik*, Vienna, June 25, 1913.]

GOLD PLATING. By W. Mueller.

The production of a durable gold plate calls for six requirements: First, a Bunsen zinc-carbon battery; second, a vessel, preferably of enamel ware, to hold the gilding solution and the object to be plated; third, gilding liquid, which can be obtained by dissolving fine and thin gold scrap in aqua regia, driving off any excess of the acid by boiling, adding a solution of 40 grams of potassium cyanid in one liter of water, and boiling the mixture for one hour; fourth, a vessel containing a hot solution of caustic soda and one with pure water; fifth, a lathe wheel of fine brass or steel wire with which the piece to be gilded is quickly cleaned and smoothed; sixth, an anode of pure gold, which can be made by rolling pure gold into a very thin plate. The object to be plated must be freed from all traces of dirt or grease, by brushing it off with the hot caustic soda solution and thoroughly rinsing in pure water. The piece is then suspended in the solution by a copper wire that is connected with the negative pole of the battery. The anode of pure gold is connected with the positive pole of the battery. After fifteen minutes the piece can generally be removed, and it is then polished with such substances as will not attack the plating nor produce even the minutest scratches. Rubbing with a paste of pulverized ammonium chlorid and caustic lime, or brushing with a very fine brush wheel and a trace of soap solution, rinsing in water and wiping dry with alcohol, will produce a high polish.

In regard to the technique of gilding, the following points should be observed: Portions that are not to be plated are coated with mastic, gum dammar, or varnish which, after the plating is finished, is washed off with alcohol or turpentine. If the gold contents of the solution become exhausted, this is indicated by the liquid losing its yellow color, and becoming clear as water. The solution can again be rendered serviceable by adding gold chlorid and some potassium cyanid.

The zinc strip of the battery which dips into the liquid must be wetted with acidulated water now and then, and freed from deposits of zinc chlorid, which retard the plating process. Large objects are connected with the zinc at several points. A dull finish is obtained by using a very dilute gilding solution, which of course retards the plating process.

[*Proceedings of the Royal Society of Medicine*, London, No. 6, 1913.]

THE PREPARATION OF THE MOUTH BEFORE OPERATION. By J. G. Turner, F.R.C.S., L.D.S.

The answer to the question as to how to prepare a mouth for operation may be put briefly, "Clean it, and leave it easily cleansable." To the question, "Whose mouth?" the answer is, "The patient's, the surgeon's, the anesthetist's, the nurse's, the surgery attendant's, the sick-room attendant's, in fact, the mouths of all who will make up the invalid's environment." It is impossible to prevent the projection of saliva from the mouth in speaking or breathing, and even in the cleanest mouth, streptococci can always be found, while in the less cleanly, pathogenic and putrefactive organisms abound. A septic mouth may allow of direct infection of any wound, and the subsequent circulation of living germs or spores in the blood is probably far more frequent than is usually recognized, while the constant swallowing of germs and their toxins from a septic mouth weighs gravely in the balance against the patient's chances of recovery.

For ideal preparation of a mouth, preceding surgical operation, all tartar must be thoroughly scaled, all ill-fitting caps, crowns, and bridges must be removed—and any cap which is thrust up under the gum is to be regarded as ill-fitting. Old fillings must be repaired or new ones inserted, and abscess treatment instituted. Thorough cleansing of the teeth, and pyorrhea treatment, if necessary, is to precede extractions, in the author's opinion. In this respect, however, his *festina lente* policy seems very open to criticism, for a wait of several days or weeks before the extraction of "septic, incurably abscessed teeth" means the prolonged ingestion of pus, and may even produce septicemia or pyemia.

When the operation is urgent, tartar and loose teeth should be removed, and all pockets and interdental spaces cleaned out with a steel probe and cotton dipped in either citric and carbolic acid solution, or sodium bicarbonate and carbolic acid solution. When nothing else can be done, the teeth and mouth should be well rubbed and sponged with one of the above solutions, followed by prolonged rinsing with a 1:60 carbolic acid solution, immediately before the operation.

If a single tooth is to be extracted, careful cleansing of the tooth and its two neighbors, and the use of a mouth-wash immediately before operation, will be found sufficient in a fairly clean mouth. The teeth must be specially cleaned at the necks under the gum edge, especially the tooth to be extracted, since germs left in this situation will be thrust up into the bone or socket by the blades of the advancing forceps. In preparation for extensive extractions, tartar must be removed and care taken to clean every edge of fillings or crowns and the interstitial spaces. In the case of septic or suppurating impacted teeth, the part should, if possible, be laid open, syringed, and packed till clean before operating, thereby limiting the chance of subsequent bone trouble. Special care must be taken in administering anesthetics to patients with septic mouths.

[*Dental Brief*, Philadelphia, November 1913.]

PORCELAIN RESTORATION FOR YOUNG CHILD. By Dr. W. A. Capon.

One of the most difficult operations is the restoration of a broken permanent incisor in a child of from seven to twelve years of age. The tooth is generally broken by an accident, and frequently the pulp is not affected, but the tooth is extremely sensitive. If the pulp is exposed, devitalization is the only resort, and the restoration can be made with porcelain, using an iridio-platinum pin extending into the canal, or a wire loop of the same metal, No. 24, anchored in the remaining portion of the crown. This work is comparatively easy, because the main requisite for strength is anchorage, which it is possible to obtain under these conditions.

When the pulp is vital and apparently healthy, it is generally desired to preserve it, which is not an easy task under the circumstances. Protection must be afforded, and cement used, because no mechanical anchorage is possible. Although such a cement filling is not very esthetic or permanent, it affords comfort, and protects the tooth until it is fully developed. If the repeated repair of the cement filling or its appearance is not satisfactory to the patient or the parents, and a permanent restoration is demanded, the following presentable appliance is recom-

mended: The broken surface is kept covered with cement for one year in order to ascertain whether the pulp has been materially affected by the trauma. Then an accurate impression of the broken section is taken in plaster, and a model is made in Melotte's metal. No. 38 platinum foil is swaged over the broken surface and allowed to extend lingually to the gum line, labially 1 mm. This thin platinum shell is reinforced with 25 per cent. platinum solder, and a small staple of No. 24 iridio-platinum wire is attached to the free surface of the shell, which is etched for the purpose of giving support to the porcelain with which the missing incisal edge is built up in three fusings. The appearance of this restoration is claimed to be unobjectionable.

[*Finska Läkaresällskapets Handlingar*, Helsingfors, Finland, No. 12, 1913.]

SOME CONSIDERATIONS REGARDING THE QUESTION OF CONDUCTIVE ANESTHESIA IN THE MANDIBLE. By Pehr Gadd, Helsingfors, Finland.

Emphasizing the great importance of mandibular anesthesia in odontology, the writer gives a brief historical review of its application and some anatomical notes regarding the mandible and its foramina. After discussing the indications for injection in the various foramina, he describes the method of external mandibular anesthesia, as practiced by him for some time in the surgical clinic of Helsingfors. Insertion of the needle is made, not as Peckert suggested, from the dorsal side, which involves insuperable technical difficulties, but at the lower margin of the mandible between the anterior border of the masseter muscle and the angle of the ramus. The writer has applied this method in ninety-two cases of extraction of molars, bicuspids, and incisors, and in two cases of filling, meeting with but five failures. The external method of mandibular anesthesia is recommended especially for cases of ankylosis and serious infections of the oral cavity and throat, when insertion of the hypodermic needle in the mucous membrane in the mouth would involve the risk of carrying infectious material to deeper strata. This, in the reviewer's opinion, is the only indication for external mandibular anesthesia. Generally a most satisfactory anesthesia is obtained by the conductive method inside the mouth, if the operator has once learned to master the technique. The external method is more complicated, painful, and formidable to the patient, and its advocacy in any other cases but these cited will only tend to complicate our technique and discourage practitioners from adopting conductive anesthesia.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, July 1913.]

THE VALUE OF RICHTER'S SILICATE CEMENT TEST AS A STANDARD FOR THE PROMPT DETERMINATION OF THE MERITS OF SILICATE CEMENTS. By Dr. R. Richter, Berlin.

Referring to Dr. Proell's prize essay on silicate cements, published in *Deutsche Monatsschrift fuer Zahnheilkunde*, February 1913, in which the demand is made for "an accurate scientific test for determining the quality of cements, also simpler methods, viz, standards for examination," which will promptly reveal the usefulness of any cement, Richter describes a series of tests, using New Harvardid as his standard material, by which the suitability, durability, and uniformity in manufacture of any silicate cement can be ascertained. The various factors tested are the degree of insolubility of silicate cements in water and in dilute acids and alkalis, their crushing and tensile strength, the action of a silicate filling upon the pulp in the presence of beryllium, phosphoric acid, or arsenic, the discoloration of silicate fillings, the properties of adhesion, expansion, and contraction of various materials. Death of the pulp under a silicate filling cannot be attributed, in the writer's opinion, to the presence of chlorin, bacteria, or arsenic, nor does it occur today more frequently under a good silicate cement filling than under a zinc phosphate cement filling. Silicate cements that show up best under tests for insolubility and discoloration are generally superior in regard to crushing and tensile strength as well as resistance to dilute acids and alkalis. The property of adhesion claimed for some brands of silicate cement is entirely unreliable, and retention of the filling must be insured by retentive cavity preparation. The behavior of silicate cements in water during and after hardening is tested by preparing a large bottle with a

doubly perforated stopper, one perforation to receive an accurate thermometer, the other a test tube for holding the test pieces of cement. Water in the large bottle is raised to and kept at blood temperature. The test piece of cement is greased with vaselin, left in the test tube for twenty minutes, and then immersed in the water of the large bottle or held in the mouth for ten minutes. The period of twenty minutes allowed for the hardening process has been agreed by several investigators to be the longest permissible for a practical silicate cement, for any cement that has not sufficiently set in twenty minutes so as to be practically immune to the ingress of water or saliva is useless for practical purposes. The pieces tested as described should exhibit a hard surface and smooth, uniform appearance. If the surface is chalky and rough and can be easily scraped, or if it is permeated with numerous blisters, or swelled, checked, and soft in places, the material tested is worthless. In order to test the silicate materials as to porosity or density in structure, the test pieces, after having been removed from the warm water of the large bottle, are immediately immersed in some coloring solution of from five to ten times the volume of the test piece, and left over night in this solution. Most suitable for this purpose are a 0.005 per cent. solution of methylene blue, and a 0.5 per cent. solution of cochineal, cherry, or blueberry for comparison of alkaline, neutral, and acid tests. Cochineal must be fairly easily removable from the test piece with tooth-brush and powder after eight, twelve, even twenty-four hours. On observing a test piece that has been made of a good silicate material in a test tube containing methylene-blue solution, it will be noticed that the surface is slightly colored, and no appreciable change has taken place in the color of the solution. If it is found that the color has disappeared from the solution, this indicates that the silicate filling has absorbed the coloring matter; either the cement had a tendency to chemical absorption of coloring matter, or the coloring matter entered the body of the cement because it was too porous or too soft or lacked in density. Contraction of a silicate cement is recognized by the coloring matter entering between the cavity walls and the body of the filling. In order to make this test reliable, the filling material must be inserted in a properly prepared cavity in an extracted tooth, since other materials, such as glass, metal, ivory, bone, etc., owing to their different coefficient of expansion and structure from natural teeth, do not give a fair test. In appended colored charts, the results of a great many tests are beautifully reproduced, and from these, valuable data may be derived as to the comparative virtues of various brands of silicate cements. The writer closes his lengthy and interesting paper by a plea that every practitioner examine every batch of silicate cement purchased, by the simple test proposed, and refuse all batches that do not exhibit uniformly good qualities, thereby protecting his patients and himself against inferior fillings, and forcing the manufacturers to strain every effort to market an almost perfect material.

[*La Odontología*, Madrid, May 1913.]

EMPIRICAL ORTHODONTIA AND NEW PRINCIPLES PROPOSED FOR A RATIONAL CLASSIFICATION. BY DR. J. VALDERRAMA, MADRID.

Pursuing his efforts at obtaining new data in regard to anatomical articulation (see "Fundamental Errors in Anatomic Articulators," DENTAL COSMOS, December 1913, p. 1205, and "Rule for Determining the Correct or Faulty Proportions of Any Profile," DENTAL COSMOS, February 1914, p. 246) Valderrama seeks to place the classification of malocclusions upon a new basis, viz, the intermaxillary parallelogram, which he obtains by uniting the condyle, the chin, the base of the nares, and the lower border of the angle of the mandible. The intersection of the diagonals of this parallelogram determines the position of the first permanent molars as the key to normal occlusion. The sum of the mesio-distal widths of the central and lateral incisors and canine on one side is equal to one-fourth of the total length of the side of the equilateral triangle of Bonwill. In order to obtain a correct classification of malocclusions, the profile and its variations must be studied according to the principles laid down in this paper and the one referred to above. The three principles explained constitute, in the writer's belief, a rational foundation of orthodontia, in contradistinction to the shortcomings of the old

and modern schools of orthodontia. The paper is liberally illustrated, and contains a classification of some seventy forms of malocclusion; yet the intricate geometrical figuring and mathematical conjecturing in which the writer indulges is hardly likely to popularize his theories.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, June 14, 1913.]

A SIMPLE METHOD FOR MAKING DURABLE INCISAL EDGES OF CEMENT IN ANTERIOR TEETH. By Zahnarzt C. Reiche, Charlottenburg.

The partial restoration of incisal edges in anterior teeth of the deciduous set, or in poor patients, frequently offers a problem to the operator, amalgam or cement alone being contra-indicated, and porcelain or gold inlays with a root-canal post being out of the question in the latter class of patients. To overcome the difficulties presented, the writer makes the incisal edge of metal, using for this purpose a frame of wire of the thickness of a stout pin, of nickelin, gold, or any resistant alloy. In vital teeth a hole of two or three millimeters' depth is bored parallel to the root-canal, and into this the wire is cemented after having been previously shaped so as to represent the outlines of the proposed filling, and flattened at the part that is to protect the incisal edge. For obtaining better retention, a groove can be cut in the flattened portion on the side that will be covered by the cement filling, with a fine carborundum stone or a bur. If the pulp is dead, the root-canal is used for anchoring the wire. In cases of emergency, where esthetic appearance counts more than durability, a silicate cement may be used as filling material, otherwise one of the less brittle phosphates is employed, the appearance and lasting quality of which can be improved by careful polishing.

[*L'Odontologie*, Paris, November 30, 1913.]

INDIVIDUAL STERILIZED SALIVA EJECTORS. By Professor H. Villain.

The disadvantages of the saliva ejector of glass or metal are evident, and a great many patients either absolutely refuse to use it, or use it with apparent disgust, although the operator may exert all his persuasive powers in giving such patients the assurance that his saliva tubes, as should be done, are boiled for at least twenty minutes after each use, and therefore are as aseptic as any of the instruments he uses. In order to overcome the labor of the sterilizing process and to do away radically with all suspicion on the patients' part, Villain has had made for him inexpensive saliva tubes of celluloid, which after thorough sterilization are sealed in a transparent envelope. This envelope is opened before the patient's eyes, and upon completion of the sitting, the tube is removed from the hose, broken in two and thrown away. Villain justly points out that a patient has a right to expect the very latest improvements in a dentist's instrumentarium, even at the risk of appearing too fastidious; he might have added that, besides actual skill, scrupulous cleanliness and asepsis are a dentist's best recommendation in the eyes of the public, which has learned to appreciate very fully the value of safety from infection.

[*La Stomatologia*, Milan, November 15, 1914.]

PHOSPHORUS NECROSIS OF THE BODY OF THE MANDIBLE, AND TOTAL RESECTION BY THE MOUTH. IMMEDIATE PROSTHESIS AND REGENERATION OF THE BONE. By Dr. V. Samarelli and Dr. A. Arlotta.

The patient in the case described was a man of thirty-three years who had been working in a match factory from his fifteenth year. The right half of the mandible and the greater part of the left half were tumefied, a fistula on the right side in the infrahyoid region discharging thick, fetid, yellowish pus. The tumor was of hard consistence, elastic, non-fluctuating, and painful upon palpation. Upon examining the mouth a fetid odor was noted; all the teeth on the right side were missing, and in place of the alveolar border an osseous plate, concave anteriorly, of irregular shape, brown color, and covered with pus, was observed. Pressure upon the alveolar ridge of the left half of the mandible was painful up to the region of the second molar. The soft tissues in the sublingual region were red, hard, and painful, the gingivæ inflamed, tumefied, and painful, and bled easily. After confirming the diagnosis of phosphorus necrosis by radiographs, beautiful reproductions of which are

appended to the paper, the mandible was resected under general anesthesia, with careful preservation of the periosteum. The resected mandible was quickly reconstructed, a plaster impression of it taken, a model made in wax and the mandible cast in aluminum and inserted in the mouth according to the principle of *prothèse immédiate.* This artificial mandible was provided with several teeth in order to preserve the articulation, a bandage holding the jaw in place. The patient was fed with liquids, and the artificial jaw removed twice a day, boiled, and replaced after rinsing the cavity with oxygenated water or a permanganate of potash solution. The appliance was gradually reduced in bulk in proportion to the regeneration of bone. When the thickness of this newly formed bone was considered sufficient, the bandage was left off. After four months, the regeneration of bone seemed to have reached its maximum, viz, a height of two centimeters in the mental region, and one and one-half centimeters toward the angles, thus regenerating the entire body of the mandible from its lower border to the inferior line of the alveolar process. An artificial denture was then constructed with perfect esthetic effect, at the same time restoring normal speech and mastication, except that the patient must refrain from excessively hard food substances.

[*Sud-Est Dentaire*, Marseilles, July 1913.]

THE USE OF SALVARSAN ("606") IN STOMATOLOGY. BY DR. M. GUIBAUD, TOULON.

Like all other medical specialties, dentistry has tried out salvarsan and its improvement, neo-salvarsan, with great success. The oral manifestations of syphilis, viz, chancre, mucous patches, and tertiary lesions, have been cured by general salvarsan treatment by intra-muscular or intra-venous injections. Following such treatment, the curious fact has been observed that no mercurial stomatitis occurred in patients who were subsequently treated with mercury. Mercurial stomatitis being due to a fuso-spirillary symbiosis of enhanced virulence in the gingivo-dentinal region, the vital resistance of which has been lowered by mercurial poisoning, it appears that "606" has a specific action on fuso-spirillary infection, and patients who before suffered greatly from mercury medication, can be prophylactically treated by salvarsan injection. In caries and pyorrhea alveolairs, salvarsan treatment has in several cases produced favorable results, from which the writer infers that valuable etiological data in regard to the specific character of these two diseases may be deduced in the future.

In Vincent's angina and ulcerous stomatitis, surprisingly rapid cures have been produced by local applications of salvarsan, either in powder form or in 10 per cent. solution in glycerin. The ulcerations are washed with physiologic salt solution and dressed with the glycerin solution of "606," which must be thoroughly triturated together in a glass mortar, until an entirely clear yellow liquid is obtained. From two to four applications are made in forty-eight hours, care being taken to introduce the solution into recesses and pockets. Within twenty-four hours, the gingivæ become adherent again, the ulcerations undergo cicatrization, the purulent discharge is almost entirely stopped, the fetor of the breath attenuates, and general symptoms improve. Microscopic examination shows that the spirochetes and fusiform bacilli disappear simultaneously. It must, however, be remembered that most buccal infections represent a polymicrobic association, and that salvarsan acts only on certain of the microbes. It is not surprising, therefore, that after the first remarkably rapid improvement, symptoms of infection persist, which must be treated according to approved methods.

Considering its fairly wide scope of application in the mouth, as discussed, the writer considers salvarsan as a standard dental remedy.

Periscope.

Disposing of Vulcanizer Steam.—Referring to A. Ernest's suggestion, clipped from *Ash's Monthly* and reprinted under "Periscope" in the December 1913 issue of the Dental Cosmos, page 1295, regarding the disposition of steam from the vulcanizer, Dr. Laurence L. Potts of Kansas City, Mo., reminds us of another method which is probably not new to a great many practitioners, but is quite worthy of adoption:

After the heat has been turned off, and the pot has been allowed to cool for about five minutes, it is lifted from the jacket and set in a pail of cold water until the top has become so cool that water will not boil when thrown upon it. If necessary, the water in the pail is changed. The pot can also be set in a washbowl in the laboratory and a cold-water spigot turned on it. When the pot has cooled, it can be opened without opening the steam valve. There will be no noise, no odor, and above all, no danger.

Septic Gastritis and Pyorrhea Alveolaris.—One of the causes of septic gastritis is pyorrhea alveolaris. Septic gastritis is an inflammation of the membrane lining the stomach, due to infection of this membrane by pyogenic micro-organisms. It may range in degree from a simple congestion to a very intense inflammation with cellular destruction. Among the clinical and histological facts that connect pyorrhea alveolaris with septic gastritis are the following: The mucosa of the stomach is frequently invaded by streptococci, the micro-organisms most constantly present in pyorrheal pockets. Septic gastritis and pyorrhea alveolaris are frequently observed to be coexistent. An antecedent history of pyorrhea alveolaris is frequently given. Streptococci and staphylococci, invariably present in pyorrhea pockets, are found in the vomit of those suffering from septic gastritis. The cure or removal of teeth affected with pyorrhea alveolaris may produce a cure or an improvement in cases of septic gastritis. A vaccine made from a culture of streptococci isolated from the mouth of a patient suffering from septic gastritis and pyorrhea alveolaris produced an improvement of the condition under treatment.—A. M. Nodine, ***Dental Digest.***

Bridge for Immobilizing Loose Teeth.—The possibility of keeping loosened teeth in their places by means of attaching them to a prosthetic piece has been much discussed.

Two things must be kept in mind—(1) The necessity of including the natural tooth in the bridge, and (2) provision for the time when the loose tooth must be extracted and it will be impossible, since the bridge is fixed, to add a substitute in the way one would in a plate or a removable bridge.

I have overcome these two difficulties in the following manner: The bridge is fitted with a loose ring soldered to a square pin. This ring steadies the loosened tooth as long as it is thought desirable to keep it in place. When it becomes so loose that extraction can no longer be avoided, the band is slit, the loose tooth extracted, and the square pin which was holding the band is removed from the bridge. An artificial tooth is then soldered to a new square pin and the pin cemented to the bridge.—Dr. Rücker, *Deutsche Zahnärztliche Zeitung* per ***Dental Record.***

Dangers of Ammonium Fluorid to Tooth Structure.—An extracted tooth immersed in a solution of ammonium fluorid, taken from bottles labeled as such and sold to the dental profession, will be completely denuded of enamel in from four to eight hours. The cementing substance seems to be dissolved out, setting the enamel rods free, a drop of the milky fluid taken from the test tube and placed under the microscope showing the loosened enamel rods. If the ammonium fluorid be renewed occasionally, layer after layer of the whole tooth can be washed away from time to time, until the entire tooth will have been dissipated.

The chemical difference in the enamel of an extracted tooth and one in the mouth being about *nil*, it seems reasonable to conclude that a chemical so destructive would be dangerous to apply to teeth, since any dissolution of the cementing substance of the enamel rods, be it ever so superficial, would create a nidus for the beginning of caries by opening the structure advantageously for the attachment of the plaque.—Editorial, *Nebr. **Dental** Journal.*

Avoiding Pain in Cavity Preparation.—Dentin, when being cut, is much less painful than when it is scraped. All instruments, therefore, should be applied at such an angle that real cutting takes place. Too much stress cannot be laid upon this point.—J. A. WOODS, *Ash's Monthly.*

Protecting Newly Made Cement Fillings.—A good protection for newly inserted cement fillings consists in a mixture of equal parts of paraffin and resin, with which the filling is coated, and which greatly enhances the density of its surface.—*Monatsschrift f. Zahnheilkunde u. Zahntechnik.*

Menthol-Phenol as an Analgesic.—Three parts menthol crystals are melted together with one part phenol crystals. This is useful as an analgesic, when applied to an aching tooth with an exposed pulp or to a painful socket after tooth extraction. It has marked antiseptic properties, but is not disinfectant in the degree required for treatment of putrescent conditions.—J. M. HOWE, *Dental Brief.*

Discoloration of Gold Fillings.—Discoloration of gold fillings is due to electric deposition of copper from amalgam fillings containing much copper. Discoloration in the walls of a tooth is due to leakage from faulty manipulation, and may occur from outside between the walls and the filling or from the pulp chamber. Pitting invariably follows as a result of insufficient condensation.—W. H. GILMOUR, *Dental Record.*

Heroic Treatment of Hypersensitive Dentin.—The best mode of treatment of hypersensitive dentin, and one that affords longer periods of relief, is the application of heat in the form of a red-hot instrument passed lightly across the sensitive spot, the part having been previously covered with a small quantity of the oil of cava-cava.

There is no doubt that this method causes intense pain for an instant and requires courage on the part of the patient when again necessary.—L. L. DAVIS, *Dental Review.*

Economic Sterilizer for Dental Instruments of Small or Medium Size.—In a dry, sterilized, large glass bottle with wide mouth and glass stopper, a layer of trioxymethylene tablets is placed vertically, covered with an even layer of raw sterilized cotton, such as is used in bacteriological work, and this cotton stratum covered with a layer of coarse-grained investment compound, about 2 mm. thick. The formaldehyd vapor given off by the tablets will satisfactorily sterilize for several months such instruments as are too delicate to tolerate such means of sterilization as boiling, the autoclave, etc. Sounds, hypodermic needles, surgical or root-canal reamers, broaches, ivory or bone spatulas, and engine handpieces can thus be sterilized effectively at a very low cost.—RAYNAL, *Sud-Est Dentaire.*

Purification of Mercury.—Mercury is not completely purified from lead by distillation in a vacuum. The lead is completely removed by rubbing repeatedly with garlic juice, lead sulfid being formed, and this method is found to purify crude mercury completely. Some mercuric sulfid is also formed. The action of the garlic juice is due to the presence of sulfids of the allyl group.—*Zeitschrift f. anorgan. Chemie,* per *Brit. Dental Journal.*

A Precaution Against Swallowing Prosthetic Pieces in Trying-in.—A little water injected into the mouth in almost every instance will cause the patient to close the throat, the water being held in the back of the mouth so long as the mouth is open. This can be taken advantage of when fitting crown bands, inlays, or whenever there is danger of an object being snapped from a working instrument in an unknown direction. —*Nebr. Dental Journal.*

Report of Two Deaths Under Ethyl Chlorid Anesthesia.—Leriche of Lyons reports two cases of death under ethyl chlorid. He attributes deaths from this anesthetic to impurities, the presence of which is not readily recognized. He advises slow and cautious induction of anesthesia when Kelène is employed, and a liberal admixture of air. Allusion is made to previous statistics, which show ethyl chlorid to be two hundred times more dangerous than nitrous oxid.—*Revue Trimestrielle Belge de Stomatologie.*

The Metric System.—Some recent reports as to the increasing use of the metric system indicate that material progress is being made toward a really international system of weights and measures. Of course for scientific purposes the metric system has held this position for a great many years.

The most notable item in the recent history of the subject is the beginning of a change from the old standards in Russia, which has now officially adopted the metric system for some purposes, and has put itself on record as favoring its general introduction. This step completes the agreement of all continental Europe in a single system.

Japan is working officially to the same end, the metric system being taught in all the public schools there. China under its new government has likewise taken preliminary

steps in the same direction, and even Siam has introduced the metric system in its public works. Only the English-speaking countries are conspicuous in sticking officially to their ancient system, and the necessities of world trade are pressing heavily to force them into line.—*Engineering Record.*

To Make Wood Fire and Acid Proof.—While it is impossible to make wood thoroughly fireproof, the following treatment will make it much safer for table tops in chemical laboratories. A solution is prepared by dissolving anilin hydroxid—commonly known as anilin salts—in water to about the appearance of thoroughly black writing ink, also a saturated solution of copper sulfate. The table top is given several alternate washings with the two solutions, the anilin first, waiting for each to dry in. It is surprising to what extent the wood will then be immune to the action of burning matches, filter paper, heat from gas burners, etc., while liquids can be washed from it as from tile or marble.—*Electrician and Mechanic*, per *Dental Brief.*

Lack of Extension for Prevention a Cause of Failure of Inlays.—There is a danger confronting the inlay method that is greater than the danger confronting the foil filling, and which is doubtless the cause of many of the failures in inlay work. Oftentimes, after a cavity has been carefully prepared for an inlay and is ready for the wax impression, or is thought to be, it may be found by drying the cavity thoroughly that along the gingival enamel margin a whitened area appears, extending a short distance in a bucco-lingual and running in a gingival direction. This incipient caries is very easily overlooked in inlay work, because the cavity is prepared without the rubber dam, and consequently under moisture, and this decay is not noticeable when the tooth is moist. In the failures in inlay work that have come under my notice there are those caused by failure of the inlay keeping its place, those caused by washing of the cement around the margin and subsequent caries at the margins, and those caused by a secondary extension or recurrence of caries.

The failures due to secondary extension of caries and recurrence are caused by a failure of the operator to observe the rules of extension for prevention in a bucco-lingual and gingival direction, viz, to find the beginning secondary caries extending gingivally from the broken-down part of the tooth, which is only noticeable when the cavity is dry.—E. D. Coolidge, *Dental Review.*

Dental Erosion and General Pathology.—Coustaing and Filderman give detailed histories of sixty-four cases of erosion of the teeth, calling attention to the inevitable coincidence of other allied stigmata of degeneration. The list includes malformations of the hands, teeth and ears, prognathism, scoliosis, delayed and disordered menstruation, or other abnormalities indicating a more or less profound disturbance in the development of the individual, which is to be attributed to hereditary influences. They have never found a case of erosion in an otherwise perfectly normal body, and conclude that it cannot be due to any transitory infection, but only to profound hereditary causes. Every child with erosion of the teeth should be submitted to a thorough physical examination.—*Revue de Médecine*, per *Journ. Amer. Med. Association.*

Treatment of Cocain Poisoning.—In the treatment of the toxic effects of cocain, amyl nitrite has been frequently employed in the past. This compound produces effects apparently contrary to those induced by cocain. The inhalation of a few drops, 5 to 6, of amyl nitrite brings about vascular dilatation with a decrease in blood pressure. This is not, however, a physiological effect truly antagonistic to that of cocain, for the reason that amyl nitrite does not act on the vaso-constrictor nerves which are over-stimulated by cocain, but acts by over-stimulating the vaso-dilator nerves. These are two very distinct physiological actions, but in the case of cocain poisoning are not undesirable. The inhalation of amyl nitrite does not paralyze the action of the cervical sympathetic nerves, inasmuch as they retain the power to constrict the bloodvessels of the head. Amyl nitrite, by inducing vaso-dilatation, causes the disappearance of the pallor and the dilatation of the pupil, and decreases arterial pressure: these results are not, however, permanent, but disappear within from three to four minutes. Because of the rapid action of amyl nitrite, this agent cannot be considered in the light of a suitable antidote against poisoning by the coca alkaloid, the action of which is persistent, prolonged, and in certain cases remote in its effects. Atropin has been employed to counteract the convulsions. Masso recommends chloral hydrate, stating that cocain in doses of 14 milligrams is completely counteracted by doses of a little over 1 gram of chloral hydrate, and again, that cocain is one of the best stimulants to be employed in the case of poisoning by the narcotics.—*La Odontología*, per *Pacific Dental Gazette.*

Cold Process of Soldering.—A strong and very quick-setting though somewhat expensive solder is obtained by the following method: Silver 8 parts, tin 10 parts, bismuth 1 part, platinum 1 part, are melted together, cast into an ingot, and rasped to filings, or otherwise reduced to small particles. When required for use, about 3 parts of filings and 1 part of mercury are mixed in a small mortar until it becomes a smooth paste. This sets in about fifteen minutes, and cannot be made workable again by heat; it must be mixed just as required. The flux consists of one part of sodium to fifty parts of mercury, which must be carefully protected from the atmosphere in a glass-stoppered bottle. The omission of the platinum reduces the strength of the solder, and lengthens the time required to harden to about one hour. The omission of bismuth makes a more granular mass, which is better for filling up crevices. With bismuth it is as smooth and plastic as potter's clay. Joints made by this solder are almost inseparable. It is very valuable in repairing surgical and philosophical instruments, the brazing of delicate springs, and in all cases where the application of heat would be hurtful or destructive.—*National Druggist.*

Color of the Cement in Setting Porcelain Inlays.—The color of the cement should never be depended on to conceal the line of contact of filling and tooth. Perfect adaptation of the porcelain alone will do that. Muslin strips and wax will not take the place of burnishing, but should always be employed in approximal fillings after the burnishing, to complete the adaptation. The wax should be cold and raised in the center when the pressure is applied, in order to give greater force at the edges. But when thin enamel forms the labial wall of the cavity, and is necessary for retention, or because the patient is unwilling to have it cut away, the color of the cement will make a great difference in the appearance of the work. Light cement under the thin enamel will make that part of the enamel appear whiter than the rest of the tooth, and also make a startling contrast to the color of the porcelain, which will be darkened by the shadow of the cement. The cement beneath the thin enamel must be dark enough to bring it to the shade of the tooth. This will cause such a darkening effect that the porcelain must be very high in tone, though always of the same color, then the dark cement will make the thin enamel match the tooth and the high tone of the porcelain will be brought down to match the enamel edge by the heavy shadow of the dark cement. If the tooth is bluish gray a much lighter shade —or higher tone—of bluish gray porcelain is chosen; if the tooth is a yellowish gray, a high tone of yellowish gray is chosen. All shades for these effects should be determined before the tooth is dry, in an average light and at an average conversational distance from the patient.—J. J. MOFFITT, *Dental Brief.*

Repairing Broken Facings in Crowns and Bridges.—Perhaps the most trying operation which a dental operator is called upon to perform is the removal of the backing and post from a root when it has been decided to construct a new crown owing to the facing having been broken off. When a Steele or similar facing has been used, the defect is speedily remedied, but when an ordinary pin tooth has been employed, the removal of the backing and pin is sometimes attended with difficulties.

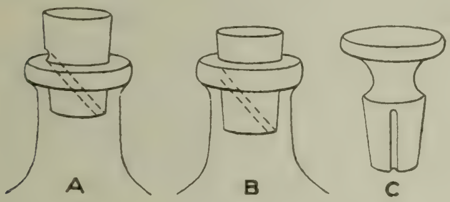
The facing, however, may be replaced without removal of either backing or post, by the following method: The old pins are ground off flush, if left in the backing; a suitable tooth is selected, and with a fissure bur two vertical slots are drilled in the backing, so that the pins of the new tooth slide easily in them, and as far up as will make the tooth accurately fit the gingival margin. In a piece of No. 4 crown gold, a trifle larger than will cover the lingual surface of the crown, two holes are punched for the pins, and with the pins in these holes, the two are slid on to the crown, so that the facing fits in its previous position, and the false backing on the lingual surface of the crown. The false backing is well burnished to the crown, and the cutting edge of the facing, the false backing and facing are waxed together with hard wax where the pins come through on the lingual side, removed carefully, invested, and the backing is soldered to the pins, trimmed off neatly at the cutting edge, finished, and cemented to place.

This method answers well with pivot crowns, bridge crowns, or attachments. Very little is added to the thickness of the crown, if the false backing is neatly burnished, and the operation may be completed in half an hour.—C. R. JOHNSON, *Elliot's Quarterly.*

Hints, Queries, and Comments.

DROPPING DEVICE FOR MEDICINE BOTTLES.

In a case of emergency, an ordinary cork without too much taper can be converted into a simple dropper, if a smooth hole is burned with the thermo-cautery, burred with a long reamer, or punctured with a straight round instrument, diagonally through the lower portion of the cork, as shown at A in the drawing. To obtain the desired drops of the liquid, the cork is withdrawn slightly, and the bottle tipped. After use the cork is pushed down, thus sealing the bottle, as shown at B. Instead of the hole, an orthodontia tube forced through the cork diagonally, and filed off flush at either end, will make a neater device.



If the liquid be of a nature tending to deteriorate cork, such as ammonia, phenol, iodin, etc., or of a volatile nature, and therefore must be kept in a glass-stoppered bottle, the glass stopper can be converted into a dropper by cutting a groove in it with a knife-edged carborundum wheel, to within one-eighth of an inch of the brim of the bottle, as illustrated at C. The manner of use is the same as with the dropping-cork. The index finger held over the cork or glass stopper prevents accidental spilling.

It is simpler, of course, to purchase a dropping-bottle, such as is used in bacteriological work, at a surgical supply house, if one is available.

Richard H. Riethmüller, Ph.D., D.D.S.

Obituary.

SIR JONATHAN HUTCHINSON, F.R.C.S.Eng., F.R.S.

Died, June 23, 1913, at Haslemere, England, in his eighty-fifth year, Sir Jonathan Hutchinson, F.R.C.S.Eng., F.R.S.

Though he was not a member of the dental profession, the name of Sir Jonathan Hutchinson, who passed away at Haslemere, England, on June 23, 1913, will long be enshrined in respectful memory by Odontology, and, even at this late date, must be recorded in these pages. His studies on the relation of malformed teeth to inherited syphilis, contributed to the Pathological Society of England in 1857, 1858, and 1859, and in his work published in 1863, created a profound sensation, and are probably those best known to dental practitioners and students. As a most versatile researcher, practitioner of medicine, consultant, teacher, and author, this great luminary ranks among the most notable personalities of the Victorian epoch.

DR. FREDERICK W. AMEND, JR.

Died, January 10, 1914, at his residence, 920 South Forty-ninth st., Philadelphia, Pa., Frederick William Amend, Jr., D.D.S., in his forty-sixth year.

The death of Dr. Amend, while not unexpected to his family and near-by friends,

came as a surprise to the many who, though far from the scene of their dental schooling, watch intently for news of the teachers or classmates of their old college. Dr. Amend was compelled to give up professional duties six weeks before his death, and from that time never left his bed, the immediate cause of death being pneumonia.

Dr. Amend was born at Elwyn, Delaware county, Pa., on September 28, 1868, removing to Philadelphia with his parents, Frederick and Katharine (Schwalbach) Amend, in his early boyhood. He received his early education in the grammar and high school of that city, and in 1885 entered the dental school of the University of Pennsylvania, from which he received his dental degree in 1887. He was immediately appointed demonstrator of mechanical technique, with complete charge of this work for the first-year classes, a position he held to the time of his death. The faculty of the school had long taken cognizance, however, of his ability and faithfulness, and in 1912 he was appointed assistant professor of mechanical technique. Hundreds of practicing alumni relate the tireless devotion given by Dr. Amend in instilling into them during their early courses the first principles of the work of plate construction, and how he impressed upon them the importance of a thorough knowledge of the physical properties of the materials they were to handle.

From the time of the organization of the Dental Alumni Society (University of Pennsylvania), Dr. Amend had been active in its interests. He was a member of the Odontographic Society of West Philadelphia, and had taken a prominent part in its doings. In 1912 he was appointed deputy supreme grand master of Epsilon chapter, Delta Sigma Delta Dental Fraternity, and during his term ruled that chapter's destinies with wisdom and impartiality, going as a delegate to the meeting of the Supreme Chapter in Kansas City, Mo., July 1913.

In his early life Dr. Amend united with Emmanuel German Reformed Church, in which he was active as a Sunday-school teacher, deacon, and treasurer. He was also interested in civic and neighborhood work, and was an officer in various building and loan associations.

In 1896 Dr. Amend married Miss Emma C. Gross, daughter of Christian Gross of Philadelphia, who survives him, together with one child, Helena K., aged sixteen years.

Services were conducted at his late residence by Rev. B. S. Stern, and interment was made on January 13th, in Fernwood Cemetery. The pallbearers were Drs. Wm. A. Allwood, James G. Lane, Robert J. Seymour, R. Hamill D. Swing, Chas. R. Turner, and Wilson Zerfing.

A. P. L.

DR. HOWARD F. REDFIELD.

Died, August 4, 1913, in Ithaca, N. Y., following an operation, in his thirty-ninth year, Howard F. Redfield, D.D.S.

In his best years, and terminating a career of great promise, Dr. Howard F. Redfield passed away on August 4, 1913, at his home in Ithaca, N. Y., shortly subsequent to an operation for a growth on the neck. He was born in 1874 at Fowlerville, N. Y.. and attended the public schools in Buffalo and Ithaca, being graduated from the old Rochester Free Academy. He then took up the study of dentistry at the Buffalo Dental College, whence he was graduated in 1895. Soon afterward he began the practice of his profession in Ithaca, acquiring a large *clientèle* and a wide reputation as a skilful practitioner.

The deceased was a member of the Rochester Dental Society, the Seventh District Dental Society, and the Dental Society of the State of New York. He leaves a widow, Mrs. Pette (Hill) Redfield, and two daughters. Interment was made at Mount Hope Cemetery.

DR. JAMES WEBSTER DENNIS.

Died, August 7, 1913, in Cincinnati, Ohio, of old age, in his eighty-second year, James Webster Dennis, D.D.S.

In the demise of Dr. James W. Dennis one of the western pioneers of dentistry has passed away, whose notes on the early days of western life and on the gold rush during the year 1849, if collected and edited, would make very interesting reading.

Dr. Dennis was born of English parents, with French Huguenot traditions, in Pittsburgh, Pa., on June 27, 1832, and when an infant, was taken by his father—who was a

skilled mechanic employed by the old Portage railroad, now part of the Pennsylvania system—to the wilds of Illinois, where he received such early school training as was then available. When still a mere youth, the gold fever lured him to California. After enduring many hardships, he returned East, and learned the gunsmith trade. Endowed with wonderful versatility and inventive genius, he took up the study of dentistry, which profession he practiced in several western cities from 1856 to the time of his decease, receiving the degree of D.D.S. from the Ohio College of Dental Surgery in 1882. He was greatly interested in the progress of dentistry up to his death, which occurred in Cincinnati, Ohio, on August 7, 1913. His warm friendship for Col. R. G. Ingersoll typified his eagerness in the search for truth.

In 1878, at Cincinnati, Ohio, the deceased was married to Clara Knapp, who, together with one daughter of a previous marriage, survives him. Incineration and interment was made at Spring Grove, Cincinnati, Ohio.

DR. JOHN NATHAN CROUSE.

DIED, of heart failure, at his home, 2231 Prairie ave., Chicago, Ill., January 16, 1914, JOHN NATHAN CROUSE, D.D.S.

Dr. Crouse, the son of Daniel and Mary (Mowrey) Crouse, was born near Downingtown, Pa., September 15, 1842. He received his early education in the village schools of Pennsylvania and Illinois, then later in Mt. Carroll Seminary, Mt. Carroll, Ill.

He began dental practice in Mt. Carroll in 1864, but later entered the Pennsylvania College of Dental Surgery, and after pursuing the regular course of instruction in that institution was graduated March 1, 1867, with the degree D.D.S. After his graduation he practiced about one year in Mt. Carroll, but in 1868 went to Chicago, where he practiced his profession continuously until incapacitated by the illness which finally terminated fatally.

From the beginning of his professional career, Dr. Crouse, besides responding to the demands of an increasingly large dental practice, devoted time and abundance of energy to the promotion of all of those activities having for their object the advancement of dental professional interests. He was one of the founders and charter members of the Illinois State and the Chicago Dental Societies. It is a remarkable coincidence that the Chicago Dental Society was organized January 16, 1864, and that the death of Dr. Crouse occurred exactly on the fiftieth anniversary, almost to the hour, of the organization of this society, which he had helped to found. The Illinois State Dental Society was organized a few months later—in May of the same year.

It was the intention of the dental profession of Illinois to signally and publicly honor Dr. Crouse at the golden anniversary of these two societies and of his connection therewith. He referred to this before he passed into unconsciousness, expressing the hope that he might live until then; but it was otherwise decreed.

He was founder and president of the Dental Protective Association; president, treasurer, and director of the Dental Protective Supply Co., and publisher of the *Dental Digest* until 1908. He was ex-president of the National Dental Association, as well as ex-president of both the Illinois and Chicago Dental Societies.

Dr. Crouse was married in 1870, at Clinton, N. Y., to Miss Ruma Arvilla Hull, who, with one son, survives him. His body was cremated and the remains interred at Rose Hill Cemetery, Chicago, January 19, 1914.

Dr. Crouse possessed a strongly individualized personality. One quickly realized upon first contact with him that he was no ordinary man, but one who, by reason of his natural endowment and educational training in the broad school of experience, was possessed of both originality and capability in dealing with the range of affairs that constituted his life-work. He had the capacity for organization developed in an unusual degree, his judgment of men was precise and accurate, and his unusual endowment of energy both physical and mental made him a natural leader among his professional colleagues. No man with such characteristics as the main springs of his active life could have made such an impression as did Dr. Crouse through a half-century of existence without creating antagonisms or misunderstanding as to his motives. The ruggedness of his personality and the indomitable courage and persistence with which he carried into effective realization all of his plans for dental professional progress necessarily aroused criticism, even

antagonism from those who failed to understand the animating motives of his activities. To understand Dr. Crouse one had to know him not as the leader, the professional reformer, the organizer in dentistry, but as Dr. Crouse the man. In his friendships he had the gentleness and tenderness of a woman. His generosity was unbounded. He gave willingly of his means, his time, and his personal efforts to serve the interests of his friends; and these same qualities determined the character of service which from the beginning to the end of his active life in dentistry he gave to the profession he loved. His enduring monument has been built in the hearts of his friends, of those who knew the man and are best qualified to estimate at its real value the splendid service which John N. Crouse has rendered to the dental profession.

One of his friends has truly said of him that "He died as he always lived, with his face toward the sun—full of hope and confidence, courageous and brave, as only real men die—with his high ideals unlowered, with his courage undaunted, and, through his belief in the mercy of God, as though he confidently expected to reap his just reward in the life beyond the grave, in realms beyond the sky."

DR. GEORGE W. COOK.

DIED, January 21, 1914, in Hebron, Ind., Dr. GEORGE W. COOK, of apoplexy, in his forty-eighth year.

Dr. George W. Cook was born in Kentucky in 1866. The war having destroyed their estate and their prospects, his parents took their two-year-old son into southern Illinois, locating in Harrisburg. Orphaned at the age of eight, young Cook found home and shelter in the families of neighboring farmers, until he was taken into the home of Dr. Hastings of Carbondale, Ill., where he attended school and performed an office assistant's duties. At sixteen he obtained a position in the Southern Illinois Hospital for the Insane, where he availed himself of the splendid opportunities offered for acquiring thorough knowledge in anatomy, physiology, and pharmacology.

After having attended the Northwestern Dental College for one year, Dr. Cook transferred himself to the University of Iowa, from which institution he received the degree of D.D.S. in 1890. After having taken a year's postgraduate course in prosthetic dentistry under Dr. L. P. Haskell, he began the practice of his chosen profession in Chicago, but indefatigably continued his studies, especially in bacteriology and pathology. During the years 1895 and 1896, in Dr. Fenger's surgical clinic, he made a study of infection through carious teeth, demonstrating that tubercular infection can take place through open root-canals.

The deceased was professor of oral surgery at the Northwestern College of Dental Surgery. He was a member of the National, the Illinois State, and the Chicago Dental Societies, the Odontological Society of Chicago, honorary member of the Southwestern Dental Association of Michigan, member of the World's Columbian Dental Congress in 1893, president of the Chicago Dental Society in 1900, and in the same year delegate to the International Dental Congress in Paris.

Dr. Cook was a prolific writer on subjects pertaining to the science and practice of dentistry. He was dean of the Illinois School of Dentistry for a number of years, and professor of pathology and bacteriology at that school until about two years ago, when he became interested in farm and country life, spending part of his time at his country home in Hebron, Ind.

In 1907, Dr. Cook was married to Miss Margaret McGill, who survives him.

His demise is deeply mourned by many personal friends, professional associates, and former students, and dentistry has lost in him an earnest researcher, conscientious teacher, and skilful practitioner.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS: March, April, and May.

MARCH.

Academy of Stomatology of Philadelphia. Philadelphia. March 24th.

Illinois State Dental Society. Chicago. Four days: March 23d to 26th.

Kentucky State Dental Association. Louisville. Four days: March 9th to 12th.

Oklahoma State Dental Association. Oklahoma City. Six days: March 30th to April 4th.

APRIL.

Connecticut State Dental Association. Hartford. Three days: April 21st to 23d.

Texas State Dental Association. Fort Worth. Five days: April 13th to 17th.

MAY.

Canadian Dental Association. Winnipeg, Man. Four days: May 26th to 29th.

Dental Society of the State of New York. Albany. Three days: May 14th to 16th.

Lake Erie (Pa.) Dental Association. Cambridge Springs. Three days: May 21st to 23d.

Massachusetts State Dental Society. Boston. Three days: May 7th to 9th.

National Dental Protective Association. Washington, D. C. May 19th.

Vermont State Dental Society. Rutland. Three days: May 21st to 23d.

Examiners' Meetings.

Massachusetts Board of Registration. Boston. March 4th to 6th.

CANADIAN DENTAL ASSOCIATION.

The Canadian Dental Association meets for the first time in Winnipeg, Manitoba, May 26 to 29 inclusive, 1914, and a convention of unusual interest and profit is expected.

M. H. Garvin, *Sec'y*,
Winnipeg, Man.

NATIONAL DENTAL ASSOCIATION.

The Local Committee tenders a most cordial invitation to every ethical dentist of the United States and Canada to attend the eighteenth annual session of the National Dental Association, to be held in Rochester, July 7, 8, 9, and 10, 1914.

Preparations are under way to make this a meeting of great interest. Rochester is known throughout the land as a convention city. It is conveniently located, which is most desirable for those wishing to visit the mountains, lakes, and many other points of historical interest.

The Local Committee will gladly furnish any information that you may desire.

Edward G. Link, *Chairman*,
226 Cutler Bldg., Rochester, N. Y.
William W. Smith,
Benedict S. Hert,
Louis Meisburger,
Charles L. Brininstool.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

The question of the relation of sulfocyanates in the saliva to susceptibility and immunity to dental caries has for some years been prominently before the profession.

Desiring to have the matter cleared up and if possible settled, we have invited Dr. Russell W. Bunting of Ann Arbor, Mich., to present the subject in a paper entitled "Potassium Sulfocyanate in Saliva," which he will read at the March meeting of the Academy. Dr. Gies of Columbia University, N. Y., Dr. Percy R. Howe, Boston, Dr. Edward C. Kirk, Philadelphia, and others will take part in the discussion.

The meeting will be held in the hall of the College of Physicians, Philadelphia, Tuesday evening, March 24, 1914. The dental profession generally is invited to attend.

Frederick R. Stathers, *Sec'y*,
Philadelphia, Pa.

Sixth International Dental Congress.

London, August 3 to 8, 1914.

PATRON: HIS MAJESTY THE KING.

MUCH progress has been made with the arrangements for the Sixth International Dental Congress, which will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and also to the self-governing Dominions of the British Empire to send official representatives to the congress, and several delegates have already been appointed. Invitations have been issued to dental societies and organizations throughout the world, and steps have been taken to secure as Reporters or Introducers of discussions in the ten sections of the congress the co-operation of leading specialists and representative authorities in all branches of dental surgery.

National committees are already at work in America, France, Germany, etc. It is hoped that national committees in all countries will stimulate interest in the congress and enlist the active support of all eligible members of the profession.

The Committee of Organization has completed the following list of Sections, Officers, and Subjects for Report and Debate. Hon. presidents of sections, representing the various countries included in the International Dental Federation (F.D.I.) will be appointed. Those nominated by the U. S. A., France, and Germany appear below. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

A Demonstrations Committee is being organized, with Mr. T. A. Coysh as chairman and Mr. W. F. Mellersh as hon. secretary.

The International Dental Congress Museum is intended to be representative of every section of the congress. Mr. A. Hopewell-Smith is chairman of the committee, and Mr. F. N. Doubleday is the hon. general secretary. Application forms and all information will be sent to all intending exhibitors on application at the Office of the Congress, 19 Hanover Square, W.

The hon. secretaries of Section IX would be glad to hear from gentlemen in all countries willing to give *short* demonstrations of lantern slides, showing (*a*) Means of affording public instruction in Dental Hygiene, *e.g.* lecture material, charts; (*b*) Photographs of School Dental Clinics or other Institutions for Public Dental Treatment. It is hoped to make this a valuable and interesting feature of the section.

The Rules of the International Dental Congress provide that all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of the country in which they practice, are eligible for membership.

The subscription for members of the congress will be 30s. (38 francs; 31 marks; \$7.50), and for members of their families accompanying them, 15s. (19 francs; 15½ marks; \$3.75).

Messrs. T. Cook & Son, Ludgate Circus, E.C., have been appointed as official Hotel and Travel Agents for the congress, and all applications should be made to them direct.

The Offices of the Congress are situate at 19 Hanover Square, London, W., to which address all communications should be sent.

ORGANIZATION.

Officers.

President: J. Howard Mummery, M.R.C.S., L.D.S.Eng.

Vice-Presidents: W. B. Paterson, L. Matheson, W. Guy, Dr. A. W. W. Baker, and the President of the British Dental Association.

President of Committee of Organization: W. B. Paterson, F.R.C.S., L.D.S.Eng.

Hon. Treasurer: H. Baldwin, M.R.C.S., L.D.S.Eng.

Hon. General Secretaries: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.D.S.Eng.; H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.

Committee of Organization.

H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.; Wm. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.; Walter Harrison, L.D.S., D.M.D.Harvard; J. Howard Mummery, M.R.C.S., L.D.S.; W. B. Paterson (president of the committee), F.R.C.S., L.D.S.

Appointed by the British Dental Association.

J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.; H. Baldwin, M.R.C.S., L.D.S.; Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.; Walter H. Coffin; W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.; A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.; Montagu F. Hopson, L.D.S.; L. Matheson, L.D.S.; Frank J. Pearce, L.D.S., D.D.S.Penn. (hon. secretary of the committee); G. O. Whittaker, L.D.S.

THE SECTIONS.

Section I.—Dental Anatomy, Histology, and Physiology.

OFFICERS.

President: A. S. Underwood, M.R.C.S., L.D.S.Eng.

Hon. Presidents: Monsieur J. Choquet, Paris; Dr. M. H. Cryer, Philadelphia, U.S.A.; Hofrat Professor Dr. O. Walkhoff, Munich.

Vice-Presidents: D. E. Caush, L.D.S.I.; J. Humphreys, L.D.S.I., M.D.S.Birm.; and J. A. Woods, L.D.S.Eng., M.D.S.Liv.

Hon. Secretaries: E. C. Sprawson, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. W. Wellings, L.D.S.Edin., B.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

The Evolution of the Human Dentition.

Calcification.

Chemistry and Physiology of Saliva.

Section II.—Dental Pathology and Bacteriology.

OFFICERS.

President: A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Cavalié, Bordeaux; Dr. T. B. Hartzell, Minneapolis, U.S.A.; and Professor Dr. Römer, Strassburg.

Vice-Presidents: F. J. Bennett, M.R.C.S., L.D.S.Eng.; J. Lewin Payne, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. W. Watson, L.D.S.Edin.

Hon. Secretaries: S. P. Mummery, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. G. G. Plumley, M.B.Lond., L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Etiology of Dental Caries.

The Etiology and Pathology of "Pyorrhea Alveolaris."

The Pathology of the Antrum.

Pathological Conditions of the Dental Pulp.

Discussion on the British Dental Association Odontome Catalog.

Section III.—Dental Surgery and Therapeutics.

OFFICERS.

President: W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Dieck, Berlin; Dr. E. S. Gaylord, New Haven, U.S.A.; Dr. Pont, Lyons.

Vice-Presidents: W. Hern, M.R.C.S., L.D.S.Eng.; J. B. Parfitt, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. O. Whittaker, L.D.S.Eng.

Hon. Secretaries: F. N. Doubleday, L.R.C.P., M.R.C.S., L.D.S.Eng.; and W. Parker Harrison, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) The Inflammatory Diseases of the Gingival Margin and Periodontal Membrane (pyorrhea alveolaris).

(*a*) The clinical signs.
(*b*) Local treatment.
(*c*) Treatment by ionic medication.
(*d*) Treatment by vaccines.

Note.—It is particularly requested that all papers should be accompanied by photographs, radiograms, etc., demonstrating the progress of cases cited and the results of treatment.

(2) The Restoration of Lost Portions of Tooth Substance by Inlaying.

(a) Inlay materials and their manipulation.

(b) Principles of cavity preparation.

(c) The cement lute.

(d) Comparison of inlays with fillings.

(3) Oral Sepsis.

(a) Oral sepsis in relation to general disease.

(b) The prevention of oral sepsis.

(c) The treatment of oral sepsis.

(d) The question of crowns, bridges and dentures in relation to oral sepsis.

Section IV.—Dental Physics, Chemistry, Radiography, and Metallurgy.

OFFICERS.

President: Montagu F. Hopson, L.D.S.Eng.

Hon. Presidents: Dr. J. P. Buckley, Chicago, U.S.A.; Monsieur Franchette, Paris.

Vice-Presidents: C. A. Clark, L.D.S.I.; H. T. Dreschfeld, L.D.S.Edin.; and R. Lindsay, L.D.S.Edin.

Hon. Secretaries: W. B. Hepburn, L.D.S.Glas., and A. E. Ironside, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Uses and Advantages of X rays as an Aid to Diagnosis, including the differentiation of the radiographic appearances of normal and abnormal tissue.

The Structural and Other Changes Arising in Connection with Metals Used in the Mouth.

The Theory and Practice of Pressure Casting. This report will be taken at a conjoint meeting with Section V. The Reporters chosen for Section IV will deal with the *theory.*

Section V.—Dental Prosthesis.

OFFICERS.

President: W. Simms, L.D.S.I.

Hon. Presidents: Dr. D. O. M. LeCron, St. Louis, U.S.A.; M. Paul Martinier, Paris; Professor Dr. Riegner, Breslau.

Vice-Presidents: G. Brunton; D. P. Gabell, L.R.C.P., M.R.C.S., L.D.S.Eng.; G. J. Goldie, L.R.C.P.&S., L.D.S.Edin.

Hon. Secretaries: H. J. Morris, L.D.S.Eng., and Wilton Thew, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

Articulation and Articulators.

Design and Retention of Partial Dentures.

The Theory and Practice of Pressure Casting. Conjointly with Section IV. Reporters for Section V will deal with the *practice.*

Section VI.—Orthodontics.

OFFICERS.

President: J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Dr. R. A. Day, San Francisco, U.S.A.; Dr. Leon Frey, Paris; Zahnarzt Schröder-Benseler, Cassel.

Vice-Presidents: G. G. Campion, L.D.S.Eng., G. Northcroft, L.D.S.Eng., D.D.S.Mich.; W. Rushton, L.D.S.Eng.

Hon. Secretaries: H. Chapman, L.D.S.Eng., D.D.S.Penn.; E. L. Councell, L.R.C.P., M.R.C.S., L.D.S.Eng., B.D.S.Liv.

SUBJECTS FOR REPORT AND DEBATE.

The Unification of Terminology and Classification.

The Problem of Retention, with a view to Permanence of Result and Minimum of Danger.

Nasal Obstruction in relation to Orthodontics; in two parts, viz: (a) The Effects of the Secretions of the Ductless Glands. (b) The Effect of the Expansion of the Dental Arches, with or without the Opening of the Sutures.

Root Movement.

The Relative Advantages of Fixed and Movable Appliances.

Section VII.—Oral Surgery and Surgical Prosthesis.

OFFICERS.

President: J. G. Turner, F.R.C.S., L.R.C.P., L.D.S.Eng.

Hon. Presidents: M. Leon Delair, Paris; Dr. J. D. Patterson, Kansas City, U.S.A.; Sch. Rat. Professor Dr. Partsch, Breslau; Professor Dr. Schröder, Berlin.

Vice-Presidents: T. S. Carter, L.D.S.Eng.; W. W. James, F.R.C.S., L.R.C.P., L.D.S.Eng.; G. M. P. Murray, F.R.C.S.I.

Hon. Secretaries: H. P. Aubrey, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. Barritt, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) Surgical Prosthesis of the Jaws.

(2) Late Results of Cleft Palate Operations.

(3) Treatment of Dental and Dentigerous Cysts.

One morning will be devoted to each subject, the rest of the time will be devoted to papers on subjects of surgical interest in the mouth.

Section VIII.—Anesthesia (General and Local).

OFFICERS.

President: W. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.

Hon. Presidents: Dr. T. P. Hinman, Atlanta, U.S.A.; Dr. J. Vichot, Paris; Professor Dr. Williger, Berlin.

Vice-Presidents: J. H. Gibbs, F.R.C.S., L.D.S.Edin.; W. A. Hunt, L.R.C.P., M.R.C.S.; J. W. Parc, M.D., C.M.Edin., L.D.S.Eng.

Hon. Secretaries: F. Coleman, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. H. Parrott, L.D.S.Eng., L.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

Gas and Oxygen, alone, in mixture, and in sequence, for the Extraction Operation.

Gas and Oxygen Analgesia for Conservative Operations.

Local Anesthesia with special reference to (*a*) Methods, (*b*) Drugs, (*c*) Sphere of Usefulness, (*d*) Contra-indications and Dangers.

Section IX.—Oral Hygiene, Public Instruction, and Public Dental Services.

OFFICERS.

President: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.SEng.

Hon. Presidents: Professor Dr. Jessen, Strassburg; Dr. Siffre, Paris; Dr. Herbert L. Wheeler, New York City.

Vice-Presidents: A. E. Baker, L.R.C.P., M.R.C.S., L.D.S.Eng.; Walter Harrison, L.D.S.Eng., D.M.D.Harv.; J. Sim Wallace, D.Sc., M.D., C.M.Glas., L.D.S.Eng.

Hon. Secretaries: C. F. Peyton Baly, L.R.C.P., M.R.C.S., L.D.S.Eng.; W. R. Wood, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Effects of Dental Treatment on National Health and Physique.

Prophylaxis at Different Ages.

Lantern demonstration of slides showing (*a*) Means of affording Public Instruction in Dental Hygiene, *e.g.* lecture material, charts, etc.; (*b*) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or other Institutions in which public dental treatment is being carried out. To be contributed to by all countries willing to send representatives. It is intended that many dentists should exhibit slides showing the working of institutions, or of public instruction, and very briefly describe them.

Section X.—Dental Education.

OFFICERS.

President: W. H. Gilmour, L.D.S.Eng., M.D.S.Liv.

Hon. Presidents: Dr. Conrad Cohn, Berlin; Dr. Henry W. Morgan, Nashville, U.S.A.; Dr. Maurice Roy, Paris.

Vice-Presidents: T. Gaddes, M.D.Denver, L.D.S.Eng. and Edin.; F. W. Richards, L.D.S.Eng.; R. Wynne Rouw, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Secretaries: F. B. Bull, L.D.S.Eng.; G. Sheppard, L.D.S.Eng., F.R.C.S., L.M.I., L.R.C.P.I.

SUBJECTS FOR REPORT AND DEBATE.

The Teaching of Bacteriology for Dental Students, with special reference to (*a*) the Method of Teaching; (*b*) the Extent of the Teaching.

A Practical Synopsis of Medical and Surgical Teaching for Dental Students.

First Principles in Practical Teaching.

Methods of Teaching Orthodontists to Dental Students.

Sixth International Dental Congress.

THE CONGRESS MUSEUM.

Its Nature and Scope.

The Museum will be an international collection of objects of interest, and be representative of every section of the congress. Its nature and scope include—

1. Specimens showing the Evolution of Tooth Forms and of the Dentition of Man. Histological Preparations bearing upon recent research. Exhibits illustrating the Chemical Composition and Physiological Action of the Saliva.

2. Specimens of Morbid Conditions of the Teeth, Palate, Gums, and Jaws, such as Odontomes, Dental and Dentigerous Cysts, New Growths, Diseases of the Periodontal Membrane, etc. Photomicrographs of Oral Microorganisms, and Cultures of Micro-organisms in Test Tubes or in Petri Dishes. New Bacteriological Apparatus and Appliances.

3. Specimens of Teeth, Gums, and Jaws affected by "Pyorrhea Alveolaris." Microscopical and Lantern Slides of the same. Exhibits of Various New Methods of Inlaying Cavities in Teeth. Exhibits of New Methods of Crowning Teeth.

4. Radiographs of the Normal Dental Tissues, and of Diseases of the same and Associated Parts.

5. Exhibition of various kinds of Articulators. Specimens showing the various Methods of "Pressure Casting." Specimens showing modern forms of Continuous-Gum Work.

6. Models showing Abnormalities in Position of the Teeth, and Appliances for the Correction of the same.

7. Specimens illustrating Methods of Dealing with Surgical Conditions of the Teeth and Jaws, including Cleft Palate, Hare-lip, Fracture and Resection of the Jaws.

8. Specimens illustrating the History and Evolution of Anesthesia.

9. Photographs, Charts, Diagrams, Specimens, and Statistics of School Clinics. Methods in the Instruction of the Public in the principles of Oral Hygiene.

10. Instruction Forms, Charts, Diagrams, Specimens, and Demonstration Models used in relation to Dental Education. The Specimens will include those employed for teaching purposes, and also Specimens of Work of both Students and Pupils, completed in accordance with the definite courses given.

11. Historical Objects of Interest, such as Books, Instruments, Pictures, etc.

Dr. A. Hopewell-Smith, chairman, earnestly invites co-operation in making this Museum of the Congress a success, and will be happy to forward the "Regulations," with "application and entry form" for intending exhibitors. Write him at International Dental Congress Office, 19 Hanover Square, London, W.

Sixth International Dental Congress.

ARRANGEMENTS OF THE AMERICAN NATIONAL COMMITTEE

APPOINTED BY THE NATIONAL DENTAL ASSOCIATION.

THE committee having in charge the affairs of the congress relating to the United States have selected the following to take part in the congress program:

Addresses.

Dr. H. J. BURKHART, Batavia, N. Y. Address on behalf of the National Dental Association at the opening session.

Dr. EDWARD C. KIRK, Philadelphia, Pa. Address before the general session, on the afternoon session of the opening day. Subject, "The Tendencies in Dental Education."

Reporters.

SECTION I: *Dental Anatomy, Histology, and Physiology.*

"The Evolution of the Human Dentition." Dr. I. N. Broomell, Philadelphia, Pa.

"Calcification." Dr. A. R. Starr, New York, N. Y.

"Chemistry and Physiology of Saliva." Dr. Edward C. Kirk, Philadelphia, Pa.

SECTION II: *Dental Pathology and Bacteriology.*

"The Etiology of Dental Caries." Dr. B. Holly Smith, Baltimore, Md.

"The Etiology and Pathology of 'Pyorrhea Alveolaris'." Dr. Percy R. Howe, Boston, Mass.

"Pathological Conditions of the Dental Pulp." Dr. R. W. Bunting, Ann Arbor, Mich.

"The Pathology of the Antrum." Dr. Chas. H. Oakman, Detroit, Mich.

SECTION III: *Dental Surgery and Therapeutics.*

"Inflammatory Diseases of the Gingival Margin and Periodontal Membrane: Pyorrhea Alveolaris." Dr. T. Sidney Smith, Palo Alto, Cal.

"Restorations of Lost Portions of Tooth Substance by Inlaying." Dr. R. Ottolengui, New York, N. Y.

"Oral Sepsis in Relation to General Disease." Dr. C. N. Johnson, Chicago, Ill.

"The Prevention of Oral Sepsis by Treatment." Dr. J. D. Patterson, Kansas City, Mo.

SECTION IV: *Dental Physics, Radiography, and Metallurgy.*

"The Uses and Advantages of X Rays as an Aid to Diagnosis, including the Differentiation of the Radiographic Appearances of Normal and Abnormal Tissue." Dr. Howard R. Raper, Indianapolis, Ind.

"The Structural and Other Changes Arising in Connection with Metals Used in the Mouth." Dr. Clarence J. Grieves, Baltimore, Md.

"The Theory and Practice of Pressure Casting." Dr. Weston A. Price, Cleveland, Ohio.

SECTION V: *Dental Prosthesis.*

"Articulation and Articulators." Dr. J. H. Prothero, Chicago, Ill.

"Design and Retention of Partial Dentures." Dr. H. J. Goslee, Chicago, Ill.

SECTION VII: *Oral Surgery and Surgical Prosthesis.*

"The Late Results of Cleft-Palate Operations." Dr. Truman W. Brophy, Chicago, Ill.

"The Treatment of Dental and Dentigerous Cysts." Dr. Wm. Carr, New York, N. Y.

"Surgical Prosthesis of the Jaws." Dr. M. C. Smith, Lynn, Mass.

SECTION VIII: *Anesthesia, General and Local.*

"Gas and Oxygen, Alone, in Mixture, and in Sequence, for the Extraction Operation." Dr. Chas. K. Teter, Cleveland, Ohio.

"Gas and Oxygen Analgesia for Conservative Operations." Dr. Thos. B. Hartzell, Minneapolis, Minn.

"Local Anesthesia with Special Reference to (a) Methods, (b) Drugs, (c) Sphere of Usefulness, (d) Contra-indications and Dangers." Dr. Eugene R. Warner, Denver, Colo.

SECTION IX: *Oral Hygiene, Public Instruction, and Public Dental Service.*

"The Effects of Dental Treatment on National Health and Physique." Dr. Herbert L. Wheeler, New York City.

"Prophylaxis at Different Ages." Dr. A. R. Melendy, Knoxville, Tenn.

"Lantern Demonstration of Slides, showing (a) Means of Affording Public Instruction in Dental Hygiene, *e.g.* Lecture Material, Charts, etc.; (b) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or Other Institutions in which Public Dental Treatment is being Carried Out." Dr. Wm. A. White, Phelps, N. Y.

SECTION X: *Dental Education.*

"Methods of Teaching Orthodontics to Dental Students." Dr. S. H. Guilford, Philadelphia, Pa.

The following have been selected as

Honorary Presidents of Sections.

I. *Dental Anatomy, Histology, and Physiology.* Dr. Mathew H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. LeCron, London, England.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

A list of essayists and clinicians will be published later.

The committee invite the ethical members of the profession of the United States to become members of the congress. Membership, which includes admission to the congress sessions and a copy of the proceedings, is $7.50, and for members of their families accompanying them $3.75.

Dr. Herbert L. Wheeler, 560 Fifth ave., New York City, has been appointed by the committee to arrange for steamship rates, sailing dates, itinerary, etc. Those desiring to attend the congress, sailing with the American delegation—immediately following the meeting of the National Dental Association, Rochester, N. Y., which closes July 10, 1914—are requested to correspond with Dr. Wheeler.

[See also notice from Committee on Transportation, next page.]

TRUMAN W. BROPHY, *Chairman*,
WM. CARR,
S. H. GUILFORD,
WALDO E. BOARDMAN,
Committee.
BURTON LEE THORPE, *Sec'y*.
3605 Lindell Boulevard, St. Louis, Mo.

Sixth International Dental Congress.

COMMITTEE ON TRANSPORTATION.

The Committee on Transportation of the National Dental Association have completed arrangements with the International Mercantile Marine Co., comprising the American, Atlantic Transport, Leyland, Red Star, White Star, and White Star-Dominion lines, whose fleet includes such large, splendid and steady steamers as the "Olympic," "Oceanic," "Adriatic," "Baltic," "Cedric," "Celtic," "Lapland," "Minnewaska," "Minnehaha," "Minnetonka," "Minneapolis," "Laurentic," and "Megantic," sailing to and from numerous prominent ports in England and the Continent, and application for sailings and rates should be sent in at once.

Our delegates to the congress will be allowed a reduction of 25 per cent. from tariff rates on all steamers of the I. M. M. Co. lines sailing on and after July 9th from America, and to August 20th from Great Britain and Europe, with the single exception of the "Olympic," August 19th from Southampton and Cherbourg for New York.

Please note that when the concession referred to would bring the price for passage below the minimum rate of the steamer selected, the lowest rate of that steamer will be charged, as follows:

To or from Plymouth, Cherbourg and Southampton, "Olympic," $130.00; "Oceanic," $110.00.

To or from Queenstown and Liverpool, "Adriatic," $110.00; "Baltic," "Cedric," and "Celtic," $100.00.

To or from Dover and Antwerp, "Lapland," $97.50; other Red Star line steamers, $85.00.

To or from Plymouth, Cherbourg, and Southampton, "Majestic," $95.00.

To or from London, Atlantic Transport line, $85.00.

Between Montreal–Quebec–Liverpool, "Laurentic" and "Megantic," $92.50.

It is important in order to obtain good accommodation that delegates to the congress should communicate at once regarding reservations with the International Mercantile Marine Co., 9 Broadway, New York City, stating the dates of their proposed outward and return sailings, also their requirements as to accommodations. Applications will be filled in the order of their receipt. A deposit of 25 per cent. of the eastbound passage money is required when the reservation is made, the balance for the round trip being payable at least three weeks prior to the outward sailing.

The committee will also reserve dining-saloon seats, steamer chairs and rugs, the deck chairs and rugs renting at $1.00 each for the voyage. Seats can also be reserved on the trains to London, for which the rates, first class, are as follows: Via Southampton, $2.75; Plymouth, $7.50; Liverpool, $7.00; Dover, $4.75.

The committee also calls the attention of delegates to the "travelers' checks" issued by the International Mercantile Marine Co. in denominations of $10.00, $20.00, $50.00, $100.00 and $500.00, which will be found the safest and most convenient way of carrying funds, as the checks are accepted by hotels, shops, banks, etc., throughout Great Britain and Europe. These are issued for their face value, plus ½ of 1 per cent. commission, and checks not used will be redeemed at face value. It will be to the advantage of the association for its members to use these checks.

As the White Star sailings available for the congress, from New York, are on July 9th, 16th, 18th, arrangements have been made with the Holland-American line for those who wish to sail on Tuesday, 14th, to do so on their steamer New Amsterdam, on which the following rates have been secured: They will allow a discount of 25 per cent. on the tariff rate, for all rooms on deck A (except the *chambres de luxe*), with the understanding that each room be occupied by three passengers. On decks B and C they will place at our disposal all outside and inside rooms we require, at the minimum rate per berth, provided that each room be occupied by three passengers. The number of passengers to be carried to be divided in proportion to the available accommodations on decks A, B, and C.

Any communications concerning this boat should be sent to Mr. Nyland, Holland-American line, 21 State st., New York City.

HERBERT L. WHEELER, *Committee*,
560 Fifth ave., New York City.

Golden Anniversary.

ILLINOIS STATE DENTAL SOCIETY.

The Illinois State Dental Society will celebrate its Fiftieth Anniversary in Chicago, at the Hotel La Salle, March 23 to 26, 1914. The society herewith extends a cordial invitation to every ethical dentist. We want you to attend and participate in this GREAT DENTAL MEETING.

Three sessions only will be devoted to the literary part of the program. There will be a symposium by two of our older men on the "Illinois State Dental Society, Its History, Achievements, and Present Standing." Then there will be two papers on dentistry proper, one an "Oration on Operative Dentistry," and the other, "Modern Crown and Bridge Work." In the completed program you will find that no better or more capable men for the task could possibly have been selected.

As to CLINICS, this great meeting might well be called a "Clinical Congress."

INTERNATIONAL DAY—*Monday, March 23d.*

Clinicians from about everywhere will demonstrate the best their respective states or countries have to offer for the advancement of dentistry.

ILLINOIS DAY—*Tuesday, March 24th.*

Clinics will be given by members of the Illinois State Dental Society. Two hundred men will demonstrate—each section running simultaneously, but in such a manner that no member of the profession in attendance will miss a single point of interest.

CHICAGO DAY—*Wednesday, March 25th.*

Celebration of the FIFTIETH ANNIVERSARY of the Chicago Dental Society A large number of clinics will be given in the offices of Chicago practitioners.

BANQUET.

Climax: Informal banquet at Hotel La Salle, to which all members, guests and ladies are cordially invited. Price per plate, $2.00.

There will be an exhibition of dental supplies and appliances given by manufacturers. The entire eighteenth floor of the Hotel La Salle will be given over to these exhibitors.

HENRY L. WHIPPLE, *Sec'y,*
Quincy, Ill.

COMPLIMENTARY DINNER TO PROF. FANEUIL D. WEISSE.

A COMPLIMENTARY dinner to Faneuil D. Weisse, M.D., will be tendered by his friends in the medical and dental professions, to commemorate his completion of fifty years as practitioner and teacher, at the Hotel Astor, Forty-fifth st. and Broadway, New York, N. Y., Saturday, March 28, 1914, at 7 P.M.

Committee—W. W. Walker, chairman, 58 W. 50th st., New York City; H. S. Dunning, secretary, 17 E. 38th st., New York City; J. W. Taylor, treasurer, 106 E. 57th st., New York City; H. W. Gillett, A. R. Starr, A. L. Swift, R. Ottolengui, W. B. Dunning, E. Hillyer, H. P. Gould, G. B. Palmer, F. W. Van Saun.

Those desiring to attend will kindly communicate with the secretary at as early a date as possible.

H. S. DUNNING, *Sec'y,*
17 E. 38th st., New York, N. Y.

KENTUCKY STATE DENTAL ASSOCIATION.

The Kentucky State Dental Association will hold a four-day postgraduate course at the Seelbach Hotel, in Louisville, March 9, 10, 11, and 12, 1914.

The lecturers for the course are Dr. Geo. H. Wilson of Cleveland, Ohio, on "Prosthetic Dentistry"; Dr. Thomas P. Hinman of Atlanta, Ga., on "Operative Dentistry"; and Dr. A. J. Bush of Columbus, Ohio, on "Crown and Bridge Work."

We shall also have papers and clinics for those who do not care to take the postgraduate course. The usual invitation is extended to all ethical practitioners to attend. We are already assured of a successful meeting.

CHAS. R. SHACKLETTE, *Sec'y,*
Louisville, Ky.

PENNSYLVANIA STATE DENTAL SOCIETY.

The forty-sixth annual meeting of the Pennsylvania State Dental Society will be held at the Bellevue-Stratford Hotel, Philadelphia, on June 30, July 1 and 2, 1914.

LUTHER M. WEAVER, *Sec'y,*
7103 Woodland ave., Phila.

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

THE annual meeting of the National Dental Protective Association will be held in Washington, D. C., May 19, 1914, at the Dental Department of George Washington University, at 7.30 P.M., for the election of trustees and transaction of business.

E. P. DAMERON, *President*,
M. F. FINLEY, *Sec'y*.

OKLAHOMA STATE DENTAL ASSOCIATION.

THE next meeting and third annual postgraduate course of the Oklahoma State Dental Association will be held in Oklahoma City, March 30 to April 4, 1914. Drs. Jos. B. Eby and Thos. P. Hinman of Atlanta, Ga., are to be the lecturers.

An important feature of the course will be a progressive clinic, conducted two afternoons of the week, by noted clinicians from out of the state.

C. R. LAURENCE, *Sec'y*,
Enid, Okla.

MASSACHUSETTS STATE DENTAL SOCIETY.

FIFTIETH ANNUAL MEETING.

THE fiftieth anniversary of the Massachusetts State Dental Society will be held on May 7, 8, and 9, 1914, at Hotel Somerset, Boston, Mass.

A. H. ST.C. CHASE, *Sec'y*,
Everett, Mass.

TEXAS STATE DENTAL ASSOCIATION.

THE thirty-fourth annual meeting of the Texas State Dental Association will be held at Fort Worth, Texas, April 13, 14, 15, 16, and 17, 1914.

In addition to the regular program, the Oklahoma postgraduate plan will be tried at this meeting. Dr. Geo. H. Wilson of Cleveland will present prosthetics with special reference to anatomical occlusion, and Dr. Frank H. Skinner of Chicago, pyorrhea, prophylaxis, and removable bridge work in connection with the same.

For information relative to space for exhibits, or as to clinics, address Dr. W. H. Nugent, Fort Worth, Texas. Any other information will be cheerfully furnished by the secretary.

FRANK FORMAN, *President*,
Waco, Texas.
J. G. FIFE, *Sec'y-Treas.*,
Dallas, Texas.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE forty-sixth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 14, 15, and 16, 1914. The literary program will be rendered at the new State Educational building. The clinics will be given at the Hotel Ten Eyck and the dental exhibits in the hotel rooms, as was arranged for the 1913 meeting, which proved very satisfactory to the exhibitors.

An exceptionally attractive meeting is being arranged. A cordial invitation is extended to all ethical dentists in New York and sister states.

Exhibitors please address Dr. O. J. Gross, 404 Union st., Schenectady, N. Y., for space.

There will be the usual reduction of railroad rates on the certificate plan.

A preliminary notice will be issued during the month of March 1914, and the following month the completed program.

The Executive Council will meet at the Hotel Ten Eyck on Wednesday, May 13th, at 3 P.M.

For further information address

A. P. BURKHART, *Sec'y*,
52 Genesee st., Auburn, N. Y.

VERMONT STATE DENTAL SOCIETY.

THE Vermont State Dental Society will hold its annual meeting in Rutland, Vt., May 21, 22, and 23, 1914.

P. M. WILLIAMS, *Sec'y*.

CONNECTICUT STATE DENTAL ASSOCIATION.

THE fiftieth anniversary meeting of the Connecticut State Dental Association will be held at Hartford, April 21, 22, and 23, 1914.

JAMES MCMANUS, *President*,
Hartford, Conn.,
ARTHUR V. PRENTIS, *Sec'y*,
New London, Conn.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

The fifty-first annual meeting of Lake Erie Dental Association will be held May 21, 22, and 23, 1914, at Hotel Bartlett, Cambridge Springs, Pa.

C. L. Mead, *Sec'y*,
Union City, Pa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-fourth annual meeting of the South Carolina State Dental Association will be held at the Chick Springs Hotel, Chick Springs, S. C., on June 17, 18, and 19, 1914. All ethical practitioners invited to attend.

The clinic will be in charge of Dr. I. M. Hair, Greenville, S. C., who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. P. Carlisle, Greenville, S. C.

Any other information will be cheerfully furnished by

W. Busey Simmons, *Sec'y*,
Piedmont, S. C.

NEW HAMPSHIRE DENTAL SOCIETY.

The annual meeting of the New Hampshire Dental Society will be held at the New Hotel Weirs, Weirs, N. H., June 17, 18, and 19, 1914.

E. H. Albee, *President*,
Louis I. Moulton, *Sec'y*,
Concord, N. H.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-fourth annual convention of the New Jersey State Dental Society will be held at the North End Hotel, Ocean Grove, N. J., July 15, 16, 17, and 18, 1914.

The hotel is situated on the ocean-front, at the foot of Wesley Lake. It is within a few feet of the Asbury Park Casino, and within a block of the Asbury Park trolley. The meetings will be held in the hotel, while the entire second floor of the pavilion will be devoted to the clinics and exhibits. This pavilion is over the ocean, with plenty of light and every chance for the cool sea breezes to blow through. A bridge over the boardwalk connects the hotel and pavilion, so that it makes an ideal arrangement for a convention.

An attractive meeting is being arranged, and a cordial invitation to attend is extended to all ethical dentists.

John C. Forsyth, *Sec'y*,
Trenton, N. J.

XI PSI PHI FRATERNITY.

Proposal to Form an Alumni Association of Pi Chapter (Univ. Pa.).

We invite all graduate members of the Xi Psi Phi Fraternity of the University of Pennsylvania to aid in the formation of an Alumni Association of Pi Chapter and become members. The committee would be pleased to receive the names and addresses of all members, as our records are incomplete. We solicit your efforts in behalf of the Alumni Association of our fraternity, and will be glad to furnish any further particulars.

Chas. Steffens, *Chairman*,
T. F. Carroll,
3612 Walnut st., Phila., Pa.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry will be held in Boston, March 4, 5, and 6, 1914.

For applications and further information apply to

G. E. Mitchell, *Sec'y*,
4 Water st., Haverhill, Mass.

WASHINGTON STATE BOARD OF EXAMINERS.

The Washington State Board of Dental Examiners will meet in May 1914 at Seattle, Wash.

Pascal W. Yearsley, *President*,
Spokane, Wash.
R. L. Moak, *Sec'y*,
Montesano, Wash.

SOUTH CAROLINA BOARD OF EXAMINERS.

The next annual meeting of the South Carolina State Board of Dental Examiners will be held at Chick Springs, S. C., beginning Friday, June 12, 1914, at 10 a.m.

Examinations are theoretical and practical on regular college branches. Applicants must

furnish instruments and material for any demonstrations called for by the board, and must exhibit diploma from a reputable dental college before being registered for examination.

For further information address

R. L. SPENCER, *Sec'y*,
Bennettsville, S. C.

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

THE Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, New York; Columbus Barracks, Ohio; Jefferson Barracks, Missouri; Fort Logan, Colorado; and Fort McDowell, California, on Monday, April 13, 1914.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general, U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present twenty-eight vacancies to be filled.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY 1914.

January 6.

No. 1,083,465, to SUMNER O. SAWYER. Dental sterilizer.

No. 1,083,509, to SAMUEL G. SUPPLEE. Dental impression tray.

No. 1,083,527, to BERNARD FELDMAN. Dental forceps.

No. 1,083,766, to PETER N. SOUZON. Keying connection for dental brushes.

No. 1,083,770, to G. W. SWOPE and W. N. BELL. Tooth-cleaning instrument.

No. 1,083,893, to H. A. EDWARDS and E. A. SHILLING. Dental pin for artificial teeth.

January 13.

No. 1,084,017, to JOSEPH LANTENBURG. Dental impression tray.

No. 1,084,029, to JOHN S. PYLE. Anesthetic-administering apparatus.

No. 1,084,182, to GEORGE VON ACH. Inhaler.

No. 1,084,537, to WALTER J. CLARK. Tooth-paste container.

January 20.

No. 1,084,766, to WALTER G. THOMAS. Dental mallet and plugger.

No. 1,084,923, to LEWIS F. BOWMAN. Tooth-brush.

No. 1,084,965, to PERLEY H. ROBERTS. Tooth-brush holder.

January 27.

No. 1,085,235, to RUFUS L. ANDERSON. Dental forceps.

No. 1,085,240, to FREDERICK H. BORST. Tooth-brush.

No. 1,085,466, to CHRISTOPH F. MONTAG. Orthodontia appliance.

No. 1,085,535, to FREDERIC H. BROWN. Support for dental face-bows.

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ORIGINAL COMMUNICATIONS.

TAKING THE OCCLUSION AND REGISTERING THE CONDYLE PATH.

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UNHAPPILY, we are still very far from the day when conservative dentistry will render our services unnecessary as far as the restoration of edentulous mouths is concerned. In that which follows is given a synopsis of my own researches during the past twenty-five years.

While dispensing with a description of the many details in the movements of the mandible, I shall call attention to the protrusive and lateral movements of the jaw.

Numerous are the investigators who have arrived at the conclusion that the condyle paths greatly vary in different individuals in their angle of inclination as they pass forward and downward. I have found variations of no less than 35 degrees between the right and the left side in the same person.

The question arises, How are we to recognize the inclination of the condyles in different individuals, and thus determine the true occlusal compensating plane?

My observations have led me to the conviction that the dental arch presents neither a curve of compensation nor a curve of Spee, but two occlusal planes.

THE OCCLUSAL PLANE OF THE DENTAL ARCHES.

I will therefore begin with an exposition of the occlusal plane of the dental arches.

In children up to ten and twelve years of age, all the teeth of the upper arch rest upon the occlusal plane. In other words, if the upper arch of a child of that age who has properly erupted all his permanent upper teeth be placed upon a plane surface, the four incisors, the two canines, the four bicuspids and the two molars, twelve teeth in all, will rest upon this plane surface.

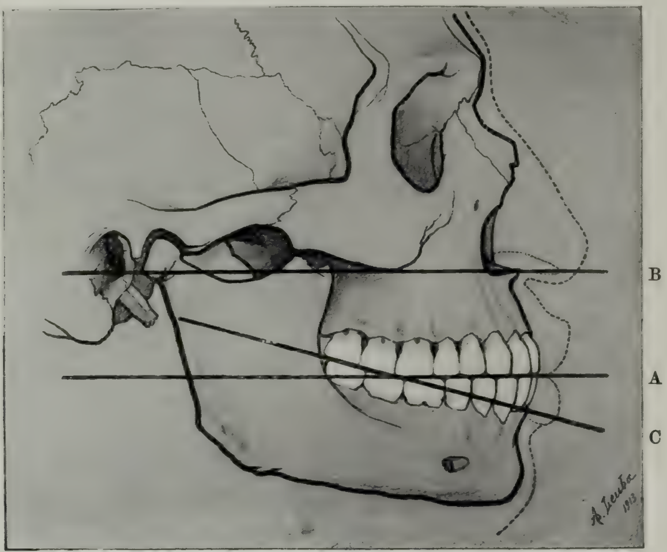
This is the *occlusal plane* of the dental arches—an immutable plane, for it is the same in the child, the adult, and in old age. To it all measurements of the dental arch will correspond, as well as

those of the condyle path. (See Fig. 1, A.)

This occlusal plane is parallel with a line drawn from the inferior part of the external auditory meatus to the insertion of the ala of the nose (see Fig. 1, B), viz. the *auriculo-naso-labial line.*

If, in an adult, the occlusal plane is prolonged backward, while the jaws are *compensation plane,* instead of "compensation curve" and "Spee's curve"—which neither correspond in any way to an anatomical reality nor do they find any application in prosthesis; while the planes which I propose considerably simplify and facilitate the understanding of the problem of articulation in artificial teeth.

FIG. 1.



A, Occlusal plane of the upper dental arch. C, Compensation plane of the second and third molars. B, Auriculo-naso-labial line, parallel to the occlusal plane.

in occlusion, this plane (A) passes on a level with the distal surface of the neck of the lower third molar.

Upon the eruption of the second and third molars another plane is formed at a mean acute angle of from 15 to 20 degrees with the occlusal plane. This is the *compensation plane,* and the angle thus formed constitutes the *compensation angle.* This plane, if projected forward, passes by the labial surface of the neck of the lower incisor. (See Fig. 1, C.)

THE COMPENSATION PLANE.

I propose to call the anterior plane the *occlusal plane,* and the posterior one the

The angle formed between the compensation plane and the occlusal plane stands in direct relation with the inclination of the condyle path. With Gysi, I have found that a condyle path of 40 degrees corresponds, on an average, with a compensation angle of half that size, that is to say, 20 degrees.

The sliding face of the palatal surface of the upper incisors stands also in relation to the condyle path and to the compensation angle. A sliding surface of 80 degrees corresponds to a path of half that size, viz, 40 degrees, and a compensation angle of one-quarter, viz, 20 degrees.

The overbite of the incisors is also

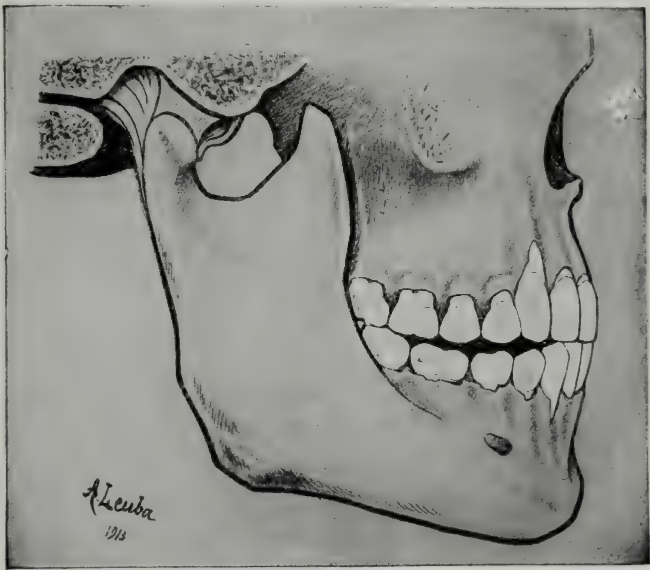
subordinated to the same angles. A path of 40 degrees corresponds with a lapping-over of the incisors of $2\frac{1}{2}$ mm.

When there is no inclination of the condyle path—that is to say, when the condyle executes the protrusive movement horizontally, the incisors will articulate end-to-end, without overbite.

masticatory surface of the upper ones will be inclined toward the cheeks, and those of the lower ones toward the palate. (See Fig. 3.)

These anatomical data are accounted for by the physiology of the dental arches. Thus, when the subject makes a movement of prehension with the in-

FIG. 2.



Protruding movement of the jaw. The condyle has come down from the glenoid cavity and has come forward, bringing the meniscus* with it, so that the movement has taken place in the menisco-temporal articulation. The second lower molar has also come down and forward, and is in contact with the distal portion of the first molar. The lower incisors have also come down and forward and their cutting edges are in contact with those of the upper incisors. The other teeth do not occlude in this protruding movement; the left side of the articulation and of the dental arches present simultaneously the same disposition. (These three points of contact of the teeth were discovered by Bonwill.)

The molar cusps and the direction of their occlusal surfaces stand also in direct relation to the condyle path. A very inclined path corresponds with long cusps; the upper ones have their occlusal surfaces very much inclined outward and downward, and the lower ones upward and inward; that is to say, the

cisors, the condyle comes down from the glenoid cavity, slipping forward under the condyle protuberance of the temporal. The lower incisors are lowered and thrown forward, in order to place their cutting edges in contact with the upper incisors. This is the *anterior point of contact.* (See Fig. 2.)

* [By "meniscus" the writer refers to the interarticular cartilage between the glenoid fossa and the condyloid process.—ED.]

The second and third lower molars are also lowered and thrown forward in order to enter into contact with the posterior part of the occlusal surfaces of the first upper molars. These are the *posterior points of contact.* (See Fig. 2.)

If, in the case of an inclined condyle path, the upper teeth, instead of being placed upon two planes (anterior and posterior), are all placed upon one straight plane, there will be a loss of contact at the level of the molars, in the protrusive movement of the jaw, and the incisors alone will join. (See Figs. 12 and 19.)

But the ingenious disposition of the posterior occlusal plane compensates this loss of contact of the molars, which is the reason why I call it the compensation plane. (See Fig. 1.)

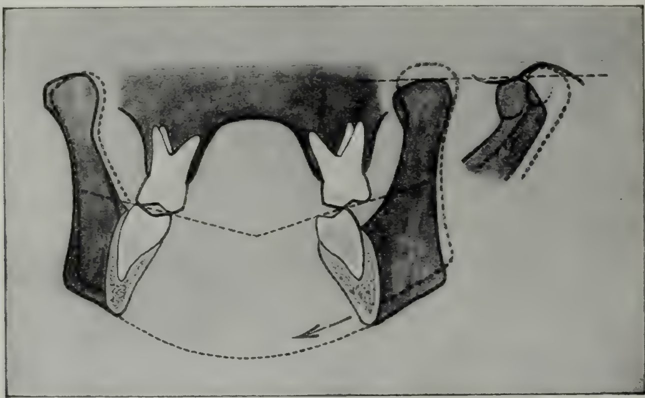
In this protrusive movement, the canines, the bicuspids, and the anterior part of the first molars must not touch each other. (See Figs 2 and 18.)

When the jaw executes a lateral movement in mastication, one side of the dental arch is always in relation with that of the opposite side as well as with the condyle path of the opposite condyle on which mastication takes place.

Thus, for example, when mastication takes place on the right side, the whole series of upper and lower buccal cusps will enter into contact, as will the upper and lower lingual cusps. (See Fig. 3.)

On the left side, alone, the lower buccal cusps will come in contact with the lingual cusps of the upper molars. When mastication takes place on the left side, the same relations occur, but in the reverse manner.

FIG. 3.



Lateral movement of the jaw toward the right. The maxillary condyle can be seen, on the left side of the figure, advancing under the temporal condyle; the lower left molar has come down and moved toward the right side. Its buccal cusp articulates with the lingual cusp of the upper first molar. The lower right molar has also moved toward the right. Its lingual cusps articulate with the upper lingual, and the lower buccal articulate with the upper buccal cusps. The masticating surfaces of the lower molars turn toward the palate, and those of the upper molars are inclined downward and toward the cheek.

IMPORTANCE OF ANATOMY AND PHYSIOLOGY IN PRACTICAL PROSTHESIS.

A knowledge of these few anatomical and physiological features of the dental arches is necessary before entering upon the study of dental prosthesis. The failures of so many practitioners in using anatomical articulators must be attrib-

uted to ignorance of these preliminary items.

I am well aware that these beautiful and harmonious anatomical laws become less and less observable in inhabitants of large cities, and in those living in high altitudes and near the sources of large streams, such as Switzerland, the Tyrol, the Rocky Mountains, Jujui (Argentina), Rio de Janeiro (Brazil), the north of Spain, etc. In such high regions we find affections of the thyroidal glands (goiter) allied with under-developed and carious teeth.

But even if we admit that our contemporaries have outgrown these laws, which is far from being the case, their application to prosthesis is absolutely indispensable, in regard to the mechanism of mastication as well as to the preservation of the masticatory apparatus.

NECESSITY OF REGISTERING BOTH CONDYLE PATHS.

The glenoid cavity presents considerable variations among our contemporaries. I presented at the Society of Stomatology of Paris a young man of twenty years of age, with thirty-two teeth; I took the impression of his dental arches, and registered the condyle paths by Christensen's method.

When the models were mounted upon the articulator, I was surprised to find, on examining the condyle paths, that the right path measured 25 degrees, while that of the left side measured 35 degrees, making a difference of ten degrees between one side and the other.

Thinking I had made a mistake. I took the measurement of the condyle path by Gysi's method, and Dr. Solbrig measured it by that of Eltner. The result was the same, viz, 25 and 35 degrees. But the most conclusive proof consists in moving the lower jaw of the articulator laterally to and fro, when the cusps of all the teeth will be seen to articulate exactly as in the mouth, and if the direction of the condyle path is changed, the cusps do not articulate reg-

Fig. 4.

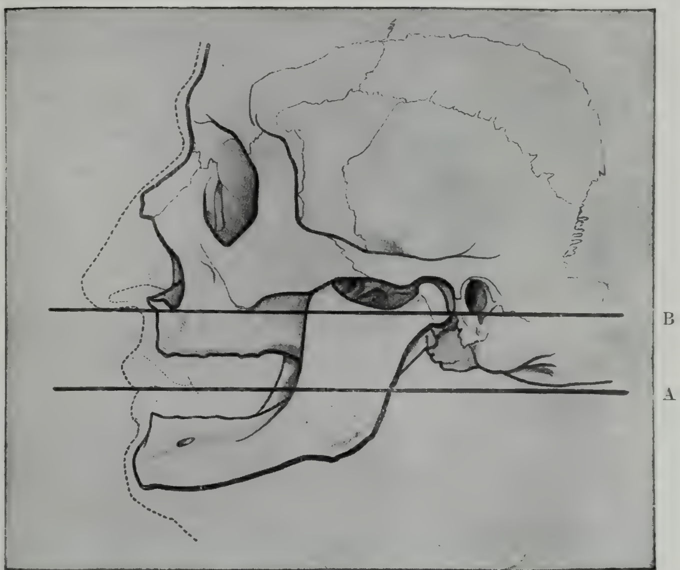
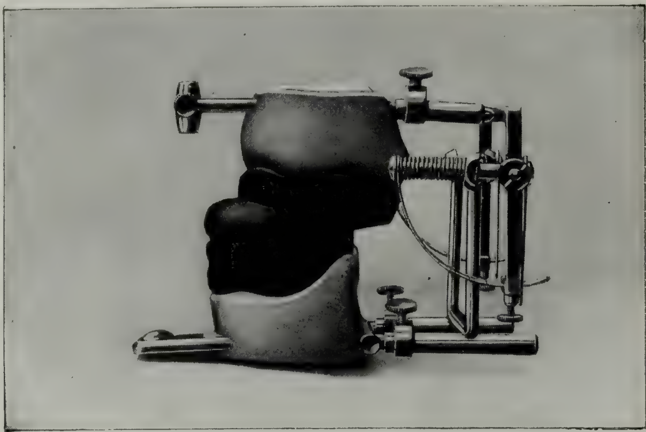


Diagram representing an edentulous mouth. A, Occlusal plane upon which all the twelve upper anterior teeth have to be placed. (See Fig. 1, A.) B, Auriculo-naso-labial line, parallel to the occlusal plane, A.

ularly; some of the cusps strike each other, while others do not meet at all.

gradually lost his teeth in the course of time.

Fig. 5.



Amoëdo's anatomical articulator, side view. The springs, representing the condyle paths, are placed horizontally. Between the bite wax plates is seen a large piece of modeling compound which has served to register the condyle path.

Fig. 6.

Same articulator as Fig. 5; front view. Two grooves may be noticed upon the lower plate on the right side, and two upon the left. They have served to fit the modeling compound balls exactly into their places.

It can easily be understood that, if the condyle path presents such differences (ten degrees) in a subject who is in possession of all his teeth, the difference will be far greater in a subject having

At the March 1913 session, I presented to the Society of Stomatology a full set of teeth which I constructed for a lady having a condyle path measuring 15 degrees on the right side and 50 degrees

on the left—that is, a difference of 35 degrees. These measurements showed, in the placing of the teeth, that there existed a compensation plane on the left side and a single straight plane on the right. The dental arches articulated perfectly in the mouth and in all their movements, and, strange to say, I did not have to correct the cusps in the least.

I have no need to insist upon the necessity of registering both condyle paths, the case I have just quoted showing this necessity superabundantly, but I may add that, in the United States, a candidate for a dental degree or license must have learned to take the direction of the condyle paths, with the manipulation of anatomical articulators, before he can take the examinations at the dental departments of universities and before the state boards.

TECHNIQUE OF DETERMINING OCCLUSION AND REGISTERING CONDYLE PATHS.

Let us now see how to proceed in order to take the occlusion of the alveolar arches and register the condyle paths. First, however, I would like to settle a point of nomenclature: I mean, by *occlusion,* the closing of the dental arches one upon the other in a state of rest, when both the maxillary condyles are situated at the bottom of the glenoid cavities; while *articulation* indicates the contact of the arches during their movements. Occlusion is the static state; articulation constitutes the dynamic state. Having determined this point, let us now consider the procedure.

I use one upper and one lower wax plate for taking the occlusion, preparing these by fixing the wax upon modeling compound plates. These must be well strengthened by a solid wire. These wax plates must give us the exact and reciprocal relation that the alveolar arches had when the subject was in possession of all his teeth.

Several methods have been suggested for overcoming the difficulties presented by certain subjects in taking these measurements. Dr. Garretson had an apparatus constructed by which he forced the condyle to remain in its cavity while taking the occlusion. I have had this apparatus in my possession for the last fifteen years, but I have had occasion to use it only two or three times. By requesting the patient to touch the posterior part of the palate with the tip of his tongue while taking the occlusion, or by asking him to swallow, the correct occlusion can easily be obtained.

Presuming that the patient closes the wax plates normally, it is important to determine the height of the lower and the upper wax individually and the total height of both plates.

In studying the dental arches we have seen which are the landmarks of the occlusal plane. (See Fig. 1.) In the case of an edentulous subject it is sufficient to introduce a spatula between the wax plates, just touching the upper lip, and parallel with a line drawn from the external meatus to the insertion of the ala of the nose on the upper lip. (See Fig. 4.) We determine thus the occlusal plane and the height of each wax plate. The total height of the wax plates can be determined mechanically by Tarpitz' compasses.

I have had occasion to verify the measurements given by the compasses in subjects having all their teeth, and I have always found the proportions to be perfectly accurate. In the case of edentulous subjects, when the required height has been found with this instrument it will be seen that the facial appearance of the patient is quite satisfactory as far as esthetics is concerned.

We have now determined the normal relations between the alveolar arches, and know the occlusal plane upon which the twelve teeth of the upper jaw will be placed. We now calculate the inclination that is to be given to the lower incisors, and what will be the compensation plane upon which the occlusal surface of the upper second molar will have to be set.

The inclination of the condyle path will give us the necessary indications.

There are different ways of obtaining the registration of this path; some operators obtain a diagram of the condyle movements on the face of the patient, others register the movements of the jaw upon wax plates inserted in the

mouth. Bonwill used occlusal wax plates which he cut, to give them what he called a compensation curve, until he obtained for each movement an exact articulation of his wax plates. Walker,* in 1896, registered the movements with an apparatus which he called the facial clinometer, and he suggested at the same time a physiological articulator with a variable path.

I imagine I am the only possessor in Europe of a specimen of this articulator; as to the clinometer, Dr. Walker is, to my knowledge, the only person who makes use of it.

It was not until 1902 that Christensen solved the problem of registering the condyle path, by suggesting a simple method which lies within the reach of all practitioners.

In 1908, Gysi† published a remarkable work on the problem of articulation. He suggested a new method for taking the condyle path, and invented an anatomical articulator with a modifiable condyle path and rotation center. I at once sent for these appliances, and traveled to Switzerland expressly to learn their working from the inventor himself. They are the most perfect appliances in existence, and in particular cases I make use of them with good results, but in everyday practice I give preference to the method which I shall presently describe.

Eltner,‡ in 1909, introduced a new method for registering the movements of the condyle. He also designed a very ingenious anatomical articulator, which is, however, very difficult to apply in daily practice.

Gysi has lately improved upon the registration of the condyle movements. He now registers the lateral movements, which vary from 10 to 30 degrees, in relation to the median line. He modified his articulator in order to allow it to show these angles on the condyle path. I fear, however, that these new difficulties, added to the relatively high price of these appliances, will only retard the use of Gysi's method.

In order to prevent complications, I have given to the cursors of my articulator an average lateral movement of 15 degrees.

But let us return to the occlusal base-plates, which I take out of the mouth after having obtained the relations of the alveolar arches, the height by means of Tarpitz' compasses, and the occlusal plane.

I make indentations upon the wax plates (see Figs. 7 and 8) to serve as guides when the plates are cool. I put the plates back into the mouth, and place between them, in the region of the bicuspids, a ball of softened modeling compound of about the size of a small nut, on the right and left sides.

I now request the patient to bite with forcible protrusion; I cool the wax with cold water and take out both wax plates, which are held firmly together by the modeling compound balls. (See Figs. 5 and 6.) I then separate the modeling compound balls from the articulation plates, and lay them aside. They have been flattened down in the mouth and bear the impress of the indentations which I cut in the wax plates. The size of the modeling compound balls may seem exaggerated, but it is necessary that they should be large, in order to preserve the relations that have been registered.

We now measure the distance between the alveolar ridge and the condyles in the incisor region.

Bonwill found that there was an average distance of 10 cm. between the two condyles, and that this distance was equal to that between each condyle and the mesial edge of the lower central incisors. The models must therefore be mounted on an anatomical articulator by placing the incisors at 10 cm. from the condyles.

But as this distance varies from 7 to 13 cm. in various subjects, it is preferable to adjust the models at the distance

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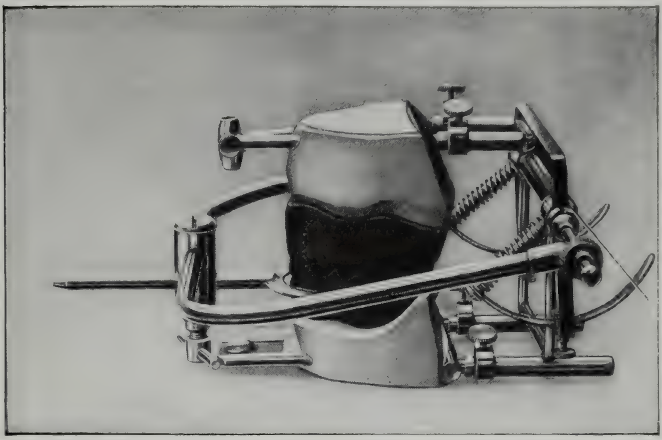
* "Movements of the Mandibular Condyles and Dental Articulation," by W. E. Walker, DENTAL COSMOS, 1896, vol. xxxviii, p. 573.

† A. Gysi: "Beitrag zum Artikulationsproblem." Berlin, 1908. (See DENTAL COSMOS, January–April, 1910.)

‡ Ernst Eltner: "Mechanik des Unterkiefers und der Zahnärztlichen Prothese," Heft 20. Leipzig, 1911.

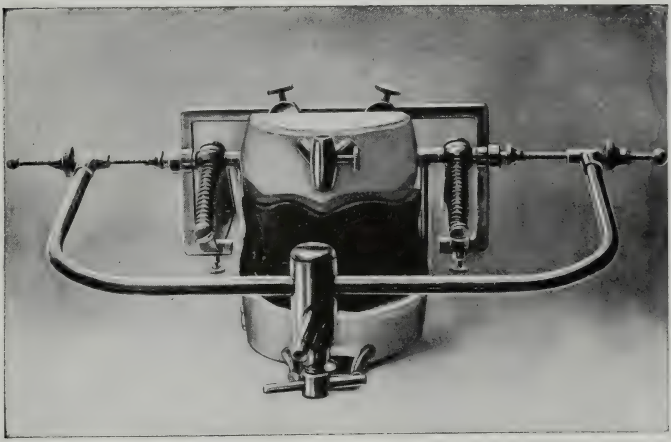
required for the patient for whom the work is being done. I always make use of Snow's face-bow. This instrument has a fork which is fixed in front of the face-bow can be fixed. I mount them upon my own articulator, which is so constructed as to receive the face-bow. (See Figs. 7 and 8.)

Fig. 7.



Snow's face-bow applied to Amoëdo's anatomical articulator; side view. This serves to determine the distance between the alveolar edges in front and the condyles.

Fig. 8.



Same face-bow as in Fig. 7, front view.

wax plates. The two ends of the bow are fixed upon the condyles, in front of the tragus.

The models may now be mounted on an anatomical articulator on which the

Our next object is to regulate the condyle paths. I again take up the modeling compound balls and put them between the wax plates, which must be fixed to the upper model; I repeat in

the lower jaw of the articulator the same movement of protrusion which the patient had executed.

an insignificant path, of less than 10 degrees, and in that case all the teeth must rest upon the same plane of occlu-

FIG. 9.

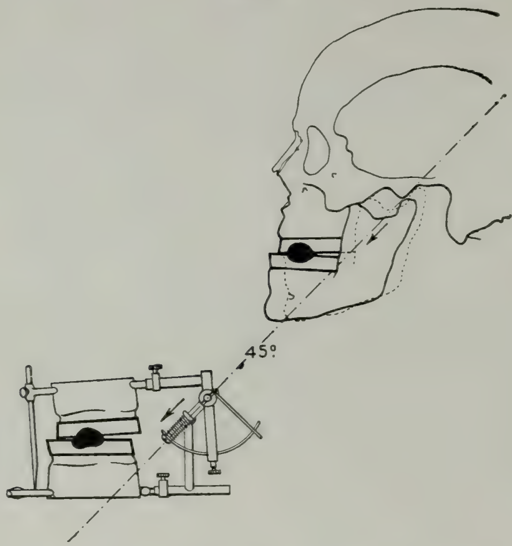
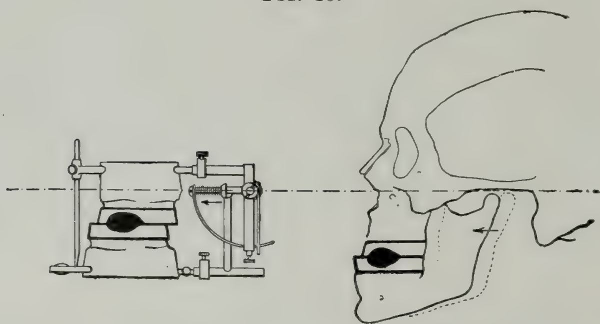


Diagram of a 45 degrees condyle path, registered by means of two modeling compound balls placed between the bite plates. On replacing the bite-plates on the anatomical articulator, the springs representing the condyle paths automatically assume an inclination of 45 degrees.

FIG. 10.

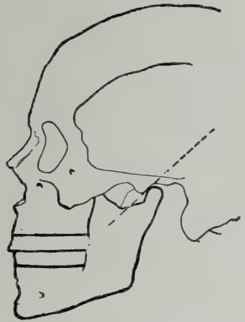


Registration of a horizontal condyle path, and automatic collocation of the equally horizontal spring.

The condyle cursors place themselves automatically at the degree of inclination which I had registered in the patient's mouth. (See Figs. 9 and 10.) If the cursors locate themselves horizontally, it is a sign that the subject has sion without compensation plane and without overbite of the incisors. If, on the contrary, the cursors are very much inclined, viz, about 40 degrees, it will be necessary to place the second molar at a considerable angle—20 degrees on

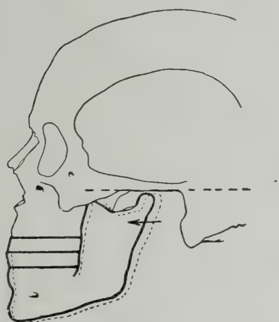
the occlusal plane. (See Fig. 12.) The incisors will have an overbite of from 2 to $2\frac{1}{2}$ mm.

FIG. 11.



Represents a deep glenoid cavity, and accordingly, a very inclined condyle path (45 degrees). The straight occlusal line representing the dental arches presents a perfect contact as long as the condyle is at rest in its glenoid cavity. The condition during the protruding movement is shown in Fig. 12.

FIG. 13.

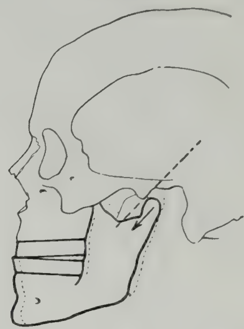


Represents a very shallow glenoid cavity, with horizontal condyle path, and therefore an inclination of 90 degrees. The jaw is represented in protrusion. The straight occlusal plane is everywhere in contact, in the molar as well as in the incisor region.

There are, of course, many gradations between these extreme cases, and even in the same subject we may find a difference of 35 degrees between the right and the left side, as I have before shown.

The diagrams in Figs. 12 to 17 furnish us the key to the technique of placing the second upper molar, starting

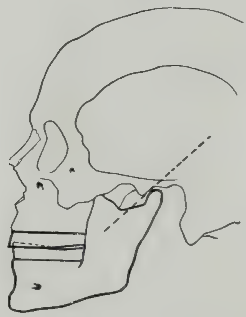
FIG. 12.



Same glenoid cavity as in Fig. 11; the condyle has come down and forward (protruding movement). Contact takes place only in the incisor region; there is no contact in the molar region.

from the compensation plane. The twelve other teeth, as I have said, must

FIG. 14.



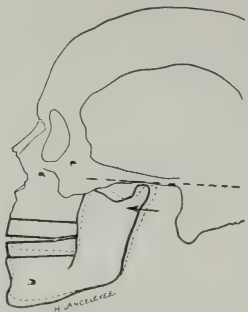
Deep glenoid cavity; occlusal line with compensation plane and overbite of the incisors. When the condyle is at rest, the teeth in the molar and incisor regions are in contact. The condition during protrusion is shown in Fig. 15.

always be placed upon a straight line. (See Fig. 1, A.)

Fig. 18 shows a full set of teeth mounted on my anatomical articulator, having an inclination of the condyles of 35 degrees; the second molar is placed

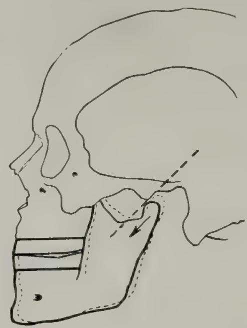
on a compensation plane of about 15 degrees in relation with the occlusal plane. The contact of the occlusion is perfect between both arches. In articulating the teeth (see Fig. 19), both in protrusion and lateral movements, the contact of the incisors and the right and left molars is constant.

Fig. 15.



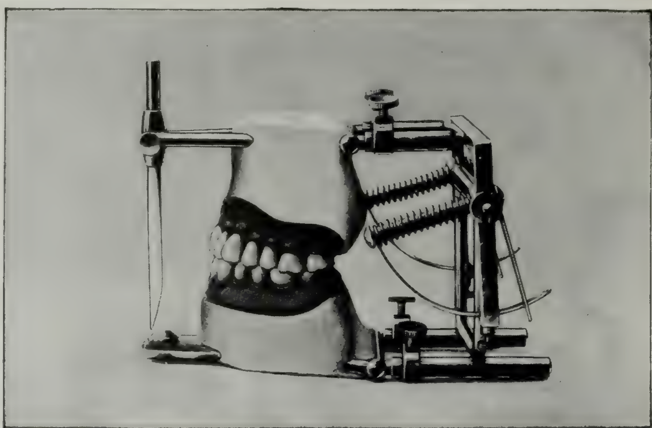
Worn horizontal glenoid cavity. Same compensation plane as in Fig. 14. During the protruding movement contact takes place only in the molar region; the incisors do not meet.

Fig. 16.



Deep glenoid cavity and compensation plane. During the protruding movement contact is established in the molar as well as in the incisor regions.

Fig. 17.



Full denture. Condyle path with an inclination of 35 degrees. All the twelve upper anterior teeth follow a straight line (occlusal plane); the second molars are placed higher up, forming a compensation plane. The arches are in a state of rest (occlusion).

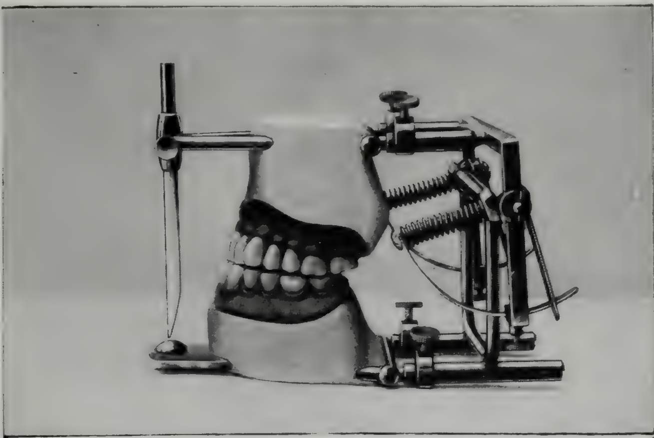
When the teeth are worn in the mouth, the same phenomenon of contact is observed in the subject who presents a condylar inclination of 35 degrees. But it suffices to change the condyle path of the articulator to see the defects which result in the contacts of the arches. For instance, if we give the condyle path an

inclination above 35 degrees (see Fig. 19) in the protruding movements, the incisors alone will be in contact and the molars will not touch each other. If, on the contrary, in the protruding movements the path is inclined less than 35 degrees, the molar region alone will be in contact. (See Fig. 20.)

These two experiments show exactly what takes place in the mouth when a set of teeth is made empirically and no care is taken to set up the teeth according to the motions of the individual jaw for which the plate is made.

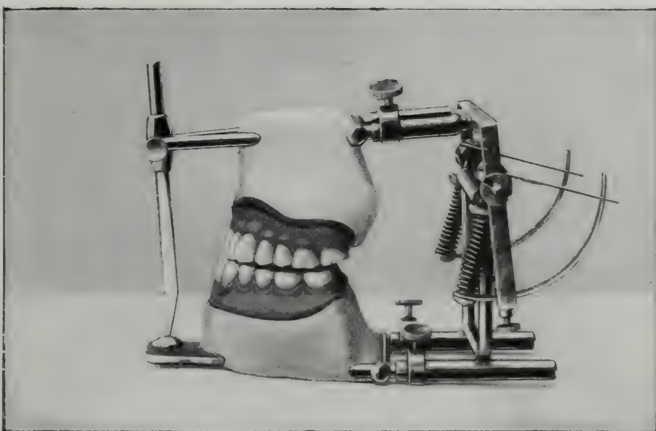
It is needless to say, over and above the rules just set down, that it is neces-

Fig. 18.



Protruding movement of denture shown in Fig. 17. Contact of the incisors and the lower second molars.

Fig. 19.



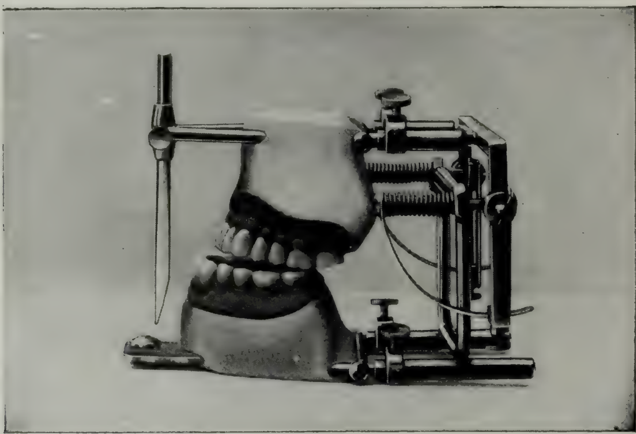
Same set, showing the condyle path with an inclination above 35 degrees. The incisors alone are in contact.

sary to place the molars under the upper alveolar crest as far as possible, following Hahn's indications in order to help to keep the plate in place in the mouth.

In case of disproportion between the upper and lower alveolar arches, it is necessary to cross the molars by placing the lower left molars above and to the right, and the lower right molars above and to the left; the upper ones are placed below, and equally crossed.

When operating on subjects of advanced age, on maniacs, or on patients with inveterate habits, these many precautions do not prevent certain difficulties, but it must be remembered that the situation would be far worse if to these difficulties were added defects in the principle of construction of a denture.

Fig. 20.



Same set. The condyle path is given a horizontal direction. The molars alone are in contact.

CONCLUSIONS.

(1) The upper dental arch presents a straight *occlusal plane,* which comprises twelve teeth—4 incisors, 2 canines, 4 bicuspids, and 2 molars. (See Fig. 1, A.) This plane is parallel with an auriculo-naso-labial line which goes from the lower external auditory meatus to the insertion of the ala of the nose, on the upper lip. (See Fig. 1, B.)

(2) Another plane, called *compensation plane,* is formed by the second and third molars. (See Fig. 1, C.)

(3) A simultaneous contact between the incisors and the molars must take place during the protruding movements of the jaw. (See Fig. 2.)

(4) Before beginning the construction of a denture, it is necessary to take into account the state of the glenoid cavity, by a registration of the condyle path. (See Figs. 6 and 7.)

(5) The twelve upper anterior teeth must be located in the occlusal plane, and the second molar in this same straight occlusal plane, if the condylar path is horizontal; or inclined upward, thus forming a compensation plane (see Fig. 18), if the condylar path is inclined.

(6) When the plates are finished, they must fit in the mouth as well as in the anatomical articulator.

TUBELESS TEETH IN PROSTHETIC WORK.

By J. L. ELPHINSTONE, D.D.S., L.D.S., Aberdeen, Scotland.

(I.) Tubeless Teeth in Vulcanite Dentures.

THE method about to be described is suitable for the construction of the strongest possible vulcanite denture, but it can also be used advantageously for making celluloid plates. It is based upon the employment of the tube tooth, which has been used for many years in metal plate work, being supported by a pin soldered to the plate, this pin passing through a tube or central perforation in the tooth.

This tube, which is lined with platinum, gives the tooth its name. The present tooth, which is better suited for vulcanite dentures, is called the tubeless tooth, because, although of the same design, it lacks the platinum tube or lining. It is also of larger bore, the tubeless having a bore of 2 mm., while the tube tooth has one of 1.50 mm.

In order to fasten the teeth on the plate it is necessary to manufacture a retainer which shall correspond to the pin anchorage of the metal plate.

The method of construction for either upper or lower plates is as follows:

The plate is modeled as usual in wax, care being taken that there is sufficient space between the model and the base of the tubeless tooth to accommodate the retainer. (See Fig. 1.) Some cases present great difficulty in fulfilling this requirement, but if the bite is too close to allow this condition to be attained, the case is unsuited for this style of tooth, and some other should be used.

In general, it may be said that this tooth is not suited for dentures the six or eight anterior teeth of which must be fitted closely to the model without any artificial gum. It might be done sometimes, but the difficulties would be great, and plain facings backed with metal would be found more adaptable.

In partial sets with one or two isolated teeth these tubeless teeth with individual retaining tags answer, on the whole, better than any other, and they are exceedingly strong, much more so than a plain pin tooth supported on a vulcanite projection. On the other hand, tubeless teeth can be used with advantage in every case in which an artificial gum of vulcanite or celluloid is used.

After modeling, the case is flasked as usual, and the wax is scalded out, leaving the teeth embedded in the upper part of the flask, the bases showing upward.

With a stone in the engine the bases of the six front teeth and four bicuspids are ground to as near a uniform level as possible, so that the retainer which will lie on them may also be of uniform outline, as irregularity means weakness. Care must, however, be taken not to weaken any individual tooth by excessive grinding. A piece of 24-karat gold of No. 36 gage (about 10 mm. thick), or German silver of similar thickness, which is obtainable as a matrix material for fillings, is now adapted in strip form to fit over the bases of the ten anterior teeth by burnishing, trimming, and annealing, until a semicircular piece of 3/16 inch in width is obtained which lies just over the exposed bases of the teeth.

With a sharp point, this matrix, while being held steady with one hand, is pierced hole by hole over the perforation of each tooth, and as each is pierced, a previously prepared post is inserted and held in place with hard wax, which may contain flux.

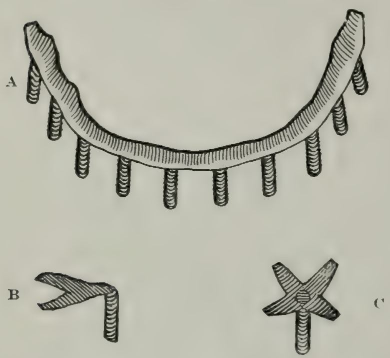
The post is made of 18-karat gold for those who can afford to pay for it, and

of German silver for those who cannot.

The posts should be screw-threaded or roughened for holding cement or vulcanite more firmly.

Wire of No. 15 gage (1.75 mm.) is commonly used, but for special cases it

Fig. 1.



Retainers for tubeless teeth. A, Multiple retainer. B, Right-angle retainer. C, Molar retainer.

may vary from 2 to 1.40 mm. according to the strength required. (See Fig. 1.)

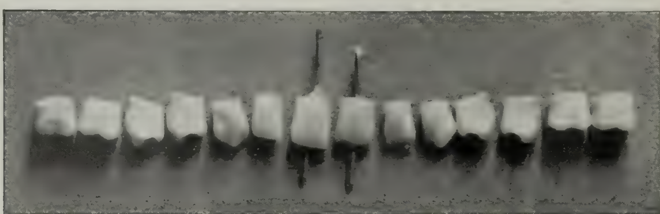
In order to insure projection of these posts through the teeth when the case is finished, they are inserted into the perforation of each tooth, after waxing up and previous to flasking. When the flask is opened, they are temporarily removed through the base of the teeth. This precaution causes the perforations to extend a little way beyond the teeth into the plaster, so that posts of full length can be used which allow the surplus to be ground off in finishing. (See Fig. 2.)

The matrix with pins attached is now disengaged from the teeth by teasing and coaxing, until it can be lifted free, without disturbing the positions of the pins. This is an important point. It is then invested, pins down, in sand and plaster, and soldered with 18-karat gold solder, or, if German silver pins are employed, with silver solder, enough solder being flowed into the matrix to form a bar of substantial strength and thickness.

In case silver solder and German silver pins are used, the finished retainer must be well gilded previous to use. It is desirable to gild in a proper electric gilding bath, but if one is not at hand, a makeshift may serve. It will be sufficient to boil in a porcelain dish in dilute sulfuric acid, adding a few drops of gold chlorid solution. This is usually obtainable ready prepared from druggists and photographic dealers. When the gold is seen to be all deposited and the bath clears, the retainer is taken out and brushed. It is boiled again with a little more gold solution, and will then be sufficiently gilded to protect the rubber against the disintegrating action of the silver.

After soldering, the retainer is tried to place. It will be found sometimes

Fig. 2.



too massive and it will not be possible to close the flask without the appliance impinging on some part of the model, and it is necessary to grind away a little of the metal until it clears the model.

At other times there is difficulty in getting the pins to enter the tubes of the

teeth. In such cases the teeth causing the difficulty may be loosened from the investment, till the pins can be introduced, and when the retainer is again pushed to place, it is generally found that the difficulty has been overcome, the teeth readily finding their places again.

Sometimes it may be expedient to grind one of the pins a little, at other times to enlarge the orifice of one or two of the tubes.

By slightly bending one or two of the posts a difficulty may be overcome, but it is possible in one way or another to succeed in getting the retainer to place, and expertness comes with practice.

The difficulty alluded to is caused partly by warping of the cooling solder, and may be minimized by flowing the solder in two sections, one at each end of the retainer, and when these are just set; but before cooling takes place, they are united by flowing the central portion separately.

In many cases it is desired to use only six tubeless teeth, ordinary pin or diatoric teeth being used for the molars and bicuspids. It is then desirable to prolong the retainer to the bicuspid region, by soldering a short piece of flattened wire to each end. This makes the anchorage in the vulcanite much surer, and makes it impossible that the six teeth be torn from the plate in one piece.

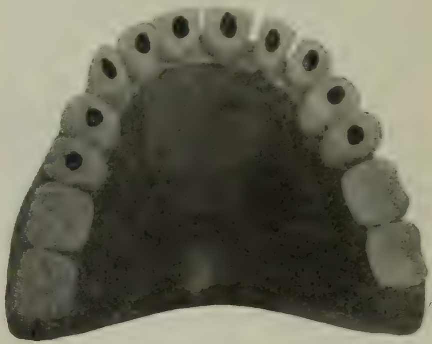
The retainer being finished, a small piece of white rubber is packed in the hole in each tooth. White rubber gives the best appearance here, and the remainder of the plate is packed with ordinary pink and red rubber in the usual way.

Sometimes it may be desired to fix two or more of the teeth with oxyphosphate of zinc cement. The central teeth can be lightened in shade in this way, and to intensify the contrast, red or black rubber may be used around the pins of the laterals and canines. Thus variety of shade may be obtained without using more than one original set of six teeth.

To make the teeth detachable, the rubber is prevented from entering the perforation of the tooth by slipping on the pin a small piece (about 1/16 inch) of the fine rubber tubing sold for the valves of bicycle tires. This occludes the entrance to the tubes, and after vulcanization the teeth thus treated are found detached, and they can be cemented on the pins after the case is otherwise finished.

Finally the protruding ends of the pins are ground flush with the porcelain. (See Fig. 3.)

Fig. 3.



It should be mentioned that within the tubeless tooth is a small slot which, in conjunction with the threaded post, forms a locking device and holds the cement or vulcanite securely.

It is usually necessary to apply this method of retention to the six anterior and bicuspid teeth only, as, with the increase in the number of teeth so supported, the difficulty of construction increases.

Tubeless teeth for molars offer no advantages, and it is my custom to use plain molars.

The bicuspids perform the burden of mastication, hence require great strength of retention.

The molars merely balance and steady the plate, and do not require to be so strong.

If however, for the sake of appearance, it is desired to have the molars uniform with the other teeth, the use of individual retaining tags is indicated, while the multiple retainer is used for the ten remaining teeth. (See Fig. 1.)

To make molar tags, a small piece of No. 28 gage metal is punched, and a threaded post is soldered at the base in the perforation. The plate is next slit around the circumference in star pattern, which grips the vulcanite very securely. Four such tags are made, one for each molar.

To support isolated teeth on a partial plate, a right-angle tag retainer is required. A piece of threaded wire, after annealing, is bent at right angles. (See Fig. 1.) The turned part is beaten flat, annealed again as required, and slit with shears to increase its hold on the vulcanite, and a small piece of solder is flowed on the bend to reinforce it.

Another method of using these teeth has been described, but it entails more work and apparently has not come into use on that account: The plate is modeled in wax, the teeth are embedded in plaster on some flat surface up to the necks, and the wax is scalded out. A sand mold is obtained of the bases of the teeth, and a die and counter-die cast. A strip of stout gold or German silver is then swaged to fit the bases of the teeth. Holes are drilled where indicated by the marks on the swaged strip. Pins are inserted and soldered. The plate is again modeled *de novo* in wax, with this retainer in position, and the case finished as usual. This method is applicable to both tube and tubeless teeth, as well as to detachable crowns. I found it troublesome, however, compared with the method previously described.

This style of denture admits of spacing, crowding, or rotating the teeth in a manner which it is impossible to obtain with plain vulcanite teeth, and thus often a more natural appearance is obtained. Should a break occur, the post is invariably intact, and all the prosthetist has to do is to adapt and cement another tubeless tooth to place.

The multiple retainer is the very best strengthener the plate itself can have. In regard to wear, the stress to which the vulcanite succumbs is that transmitted through the teeth, and the place for a strengthener is right under the teeth on the top of the alveolar ridge.

(II.) Tubeless Teeth for Crowns in Conjunction with Screw Posts.

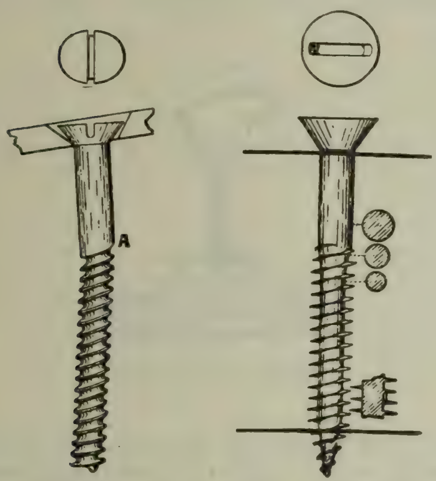
Tubeless teeth are well suited in crown work for anterior and for single-rooted bicuspids. When tubeless teeth are used in anterior teeth, the ends of the posts do not come in sight, while in bicuspids the post resembles a small gold filling and is quite unobjectionable. It is claimed that it is easier to obtain perfect results by this than by any other method, as it simplifies the preparation of three separate elements, each of which is dealt with better when uncomplicated by the other two. These parts are crown, post, and diaphragm.

A screw post constitutes the strongest possible attachment for a crown. As dentin, in working qualities, much resembles hard wood, a screw similar to the carpenter's is the kind preferred. It is self-tapping when screwed into a previously reamed canal. The core is slightly taper, while the thread is almost cylindrical and sharp of edge. Thus the core becomes thicker at the expense of the surrounding thread. This arrangement means strength and uniform grip. Such a post holds well in a canal that has been reamed so as to form a cylinder, with a round bur of slightly smaller caliber. Unfortunately these screws are not obtainable ready-made in the noble metals. They are obtainable in the base alloys, platinoid, iridinoid, and platene. If the dentist wishes to use the noble metals, he must cut his own screws, and the V-pattern thread will be found to grip the dentin best on account of the sharp edge. Iridio-platinum is undoubtedly the best material, being strongest, but 17-karat gold with 5 per cent. platinum is cheaper and quite strong enough. It may be noted that a slight increase in the size of the post affords a very great increase in strength, and that a small encroachment on the dentin will be sufficient to allow of the introduction of a post thick enough and strong enough to dispel all doubt. Heating and annealing is not required in the process about to be described, but it is specially to be noted that annealing robs base alloys of all their stiffness,

and with these alloys it is accordingly to be avoided in every case.

Screws do not tap the dentin by cutting into it. They merely compress it where contact is made, and further tapping is quite undesirable for our purpose, since depth of thread in excess of the compression obtainable is merely strength lost either to the core or to the dentin. The root is first treated in the usual way to secure asepsis. The apex is sealed, and it is desirable to carry out these processes previous to reaming, to prevent access of irritants to the apical pericementum, and because reaming often obscures the continuation of the canal in the portion where it narrows near the apex.

FIG. 4.



(From Cassell's "Handyman's Book.")

The use of tubeless teeth is specially indicated in badly broken-down roots. In these, after all accessible carious portions have been removed, the gum must be forced aside. A temporary screw post is engaged in the canal—a brass wood-screw with the head cut off serves quite well for a few days. (See Fig. 4.) A little cotton is spun into a loose rope between finger and thumb. Next it is packed tightly with an instrument around the post and against the gum. Finally a temporary tubeless tooth is adjusted and fixed with gutta-percha. Pressure is thus maintained on the gum, and it is exceptional that there is any need for cutting away redundant tissue, and an unpleasant operation is avoided.

A cushion of cotton gives a rapidity of action which is not obtainable with gutta-percha alone, and its action is much gentler. It is necessary to use some antiseptic on the cotton. I have found double cyanid cotton, which contains 2 per cent. double cyanid of zinc and mercury, very suitable; it remains clean and fresh in the mouth for many days. As the gum recedes, the dressing is renewed from time to time, and complete exposure of the root is made. All carious portions are removed with a bur, excavator, and stone in the engine. Softened tissue should be scrupulously removed. Sometimes, in bicuspids, a ferrule matrix filled with gutta-percha is used over the cotton for exerting pressure on the gum. This is often more convenient than a porcelain tooth. All ragged and weak margins of the root should be broken down and removed, and the outline made as smooth and firm as possible, since these parts are usually hopelessly infected, and irregularity means difficulty in fitting. In case of close bite, we often secure considerable extra thickness and strength of porcelain by judicious removal of such doubtful tissue. The accomplishment of these processes often causes bleeding, and it is well to pack again with the double cyanid cotton, and give the root a few days' rest.

FIG. 5.

Micrometer, graduated to millimeters, and with a rotating device which further shows 1/100 mm.

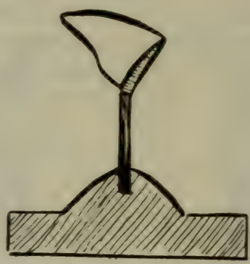
Next the canal is reamed with a round bur, from 15 to 20 mm. less in diameter than the selected permanent screw post. I am accustomed to measure the screw post and bur in a micrometer gage, graduated to one-hundredths of a millimeter. These are used by jewelers and are not expensive. (See Fig. 5.) The farther in reason we can get the post into the canal, the better. In an average case it goes to within 3/16 or 1/8 of an inch of the apex, but of course a screw post cannot be bent to follow the canal. By means of a thin carborundum disc in the engine, the end of the post is next notched to receive a screwdriver. (See Fig. 6, A.) Care is to be taken that the post nearly fills the perforation in the porcelain tooth. This is 2 mm. approximately in diameter, and the most useful sizes of posts will range from 1.60 to 2 mm. If the post is small, the terminal notch can be prized open, so as to practically rivet the tooth. The post is screwed into the canal, and the selected tooth tried. Invariably the anterior teeth have too much forward slant, and it is necessary to bend the post where it emerges from the root, till the correct slant is obtained and the chosen tooth is in line with the natural teeth on either side of it. (See Fig. 6, B.) Finally the post is permanently screwed to place and fixed with cement to which some antiseptic such as powdered thymol has been added. If a removable post is required, gutta-percha is used for fixing. Gutta-percha reinforced by the screw can be used with confidence. The anterior third of the porcelain is now fitted to the root, while behind this sufficient space is left for the thickness of the diaphragm. On the margin a notch is ground to accommodate extra wax for placing the sprue-former; this notch also forms a groove for guiding the finished diaphragm to place. The porcelain is beveled to a feather edge within the anterior margin, by hollowing out its root surface with a small stone. If the crown chosen is nearly of the same size as the root, only a thin diaphragm is needed, while a little extra thickness will help to adjust any irregularity of size. This difficulty is avoided by selecting a tooth of suitable size, but if this is unobtainable, it is at the posterior margins that the disparity shows. The posterior margin of the diaphragm must be thickened by beveling either the root or the porcelain tooth behind, and allowing the finished diaphragm to overlap the bevel.

Fig. 6.

A B

A, End of screw notched to take screwdriver. B, Screw bent to bring crown in line with neighboring natural teeth.

Fig. 7.



Ready for investing.

Owing to the bend in the post, the anterior margin of the porcelain tooth is thrown forward, so that, even when it is of smaller size, it seldom falls short of the root on this aspect.

To make the wax form for the diaphragm a special wax is prepared by melting one part rosin with three parts ordinary inlay wax. The rosin is added to make the wax adhesive. A pellet is softened and put on top of the previously warmed tooth, the whole being pushed to position over the end of the post, and trimmed to fit the root. It is sometimes impossible to complete the trimming in

position on the root on account of the closeness of the neighboring teeth. In such cases the tooth with the wax attached is removed from the root, and the trimming is completed by light touches of coarse sandpaper disks in the engine, being guided by the outlines of the root impressed on the wax. The wax form remains attached to the tooth, which is a convenience in handling and trimming. The wax should not overlap the margins of porcelain more than can be helped, since that would increase the risk of fracture in casting. The wax should also be cleared away from the perforation of the tooth, and for a little way all around it, so that no gold may enter or grip the margins. A sprue-former with a fine point is inserted in the chosen position on the margin of the wax form, still attached to the tooth. (See Fig. 7.) It is invested in the usual manner and the diaphragm is cast in 24-karat gold. It is best to cast on the porcelain, because the wax is thus easier handled and because an exact fit of the gold on the porcelain is secured; moreover, the porcelain presents an impediment to the shrinking of the gold and thus causes it to fit the root absolutely. It is a matter of the utmost moment that pure 24-karat gold be used, since 22-karat gold, or any other alloy of gold, would generally fracture the tooth on cooling, while with 24-karat, owing to its exceeding softness, there is no danger of checking.

After casting, the tooth is cemented on the root. The post is ground flush with the surface of the crown either before or after cementing. Should the cast diaphragm, as it generally does, remain attached to the tooth, it is not desirable to detach it, but in order to secure an impermeable joint it ought to be dipped in melted hard paraffin. When cold, the paraffin is scraped away from the surface and from the inside of the tube previous to cementing.

It is claimed for this crown that it is stronger than any other. A screw post unimpaired by heat cannot be excelled, and every dentist knows that it is generally the post that fails in crowns. The porcelain, too, is exceedingly strong. These crowns seldom or never break, but in any case a new one is soon put in place and cemented on the post. One cause of failure in crowns is the loosening of the porcelain tooth from the post. The tubeless tooth has a maximum length of post engaged in the porcelain, often half as much again as the ordinary detachable crown. Opening the terminal notch in the post is equivalent to riveting. The bend of the post in anterior teeth is also favorable, in that the force of mastication has a tendency to lock the crown in the acute angle thus formed with the face of the root.

METALLURGY, WITH SPECIAL CONSIDERATION OF GOLD. THE SCIENCE AND ART OF METALLURGY. METAL-WORKERS. DENTAL METALLURGY.

By NEWTON A. TEAGUE, D.D.S., Augusta, Ga.

(Read before the Southern Branch of the National Dental Association, at its annual meeting, at Old Point Comfort, Va., July 22, 1913.)

METALLURGY is a branch of applied science the object of which is to describe and criticize scientifically the methods used industrially for the extraction of metals from their ores. Of the large number of metals enumerated in the handbooks of chemistry, the vast majority, of course, lie outside its range. "In metallurgic discussions the term 'metallic' as applied to compounds has a restricted meaning, being exclusive of all the light metals, although one of these, namely, aluminum, is being manufactured industrially."

HISTORICAL REVIEW.

The history of metallurgy up to the most recent times is obscure. It was only about the beginning of the nineteenth century that this art had come to be at all scientifically criticized, and, in the case of the more important processes, all that science has been able to do has been merely to put her stamp upon what experience has long found to be correct.

Great and brilliantly successful scientific efforts in the synthetic line are not wanting, but they all belong to recent times. Science, by its very nature, aims at publicity; empiricism at all times has done the reverse, hence a history of the development of the art of metallurgy does not and could not exist.

The earliest evidence of a knowledge and use of metals is found in the prehistoric implements of the so-called bronze and iron ages. In the earliest periods of written history, however, we meet with a number of metals in addition to these two. The Old Testament mentions six metals, gold, silver, copper, iron, tin, and lead. The Greeks, in addition to these and to bronze, came also to know mercury; and the same set of metals without addition forms the list of the Arabian chemists of the eighth, and of the Western chemists of the thirteenth century. During the fifteenth century Basilius Valentinus discovered antimony; about 1730–40 the Swede Brand discovered arsenic and cobalt—the former is not reckoned a metal by modern chemists—while the Englishman Ward recognized the individuality of platinum. Of the four metals, palladium, rhodium, iridium, and osmium, which always accompany platinum in its ores, the first two were discovered by Wallaston in 1803, the other two by a number of chemists.

After Davy in 1807 and 1808 had recognized the alkalis and alkaline earths as metallic oxids, the existence of metals in all basic earths became a foregone conclusion, which was verified sooner or later in all cases. Of the large number of discoveries of rare metals which have been made in more recent times, only a few can be mentioned as marking new departures in research, or offering other special points of interest.

The development of earlier notions on the constitution of metals and their genetic relation to one another forms the most interesting chapter in the

history of chemistry. What modern science has to say on the matter is easily stated: "All metals properly so called—*i.e.* all metals not alloys—are elementary substances, hence chemically speaking they are not 'constituted' at all, and no two can be related to each other genetically in any way whatever. All metallic elements agree in this, that they form each at least one basic oxid, or what comes to the same thing, one chlorid, stable in opposition to liquid water. This at once suggests an obvious definition of metals as a class of substances, but the definition would be highly artificial, and objectionable on principle, because when we speak of metals we think, not of their accidental chemical relations, but of a certain sum of mechanical and physical properties which unites them all into one natural family."

CHEMICAL CHANGES IN METALS.

The chemical changes to which metals are liable may be classified according to the loss of metallicity involved in them. Any two or more metals, when mixed together in the liquid state, unite chemically, or at least molecularly, in the sense that although the hot mixture on standing may separate into layers, each layer is a homogeneous solution or "alloy" of, in general, all the components in one another. With binary combinations, the following two cases may present themselves: (1) The two metals mix permanently in any proportion; (2) either of the two metals refuses to take up more than a certain limit-proportion of the other. Hence a random mixture of the two metals will in general part in two layers, one a solution of A in B, the other a solution of B in A. The first phenomenon presents itself very frequently; it applies, for instance, to gold and silver, gold and copper, copper and silver, lead and tin, and any alloy of these two and bismuth. The existence of crystallized alloys, as the phenomenon of liquation generally, strongly suggests the idea that alloys generally are mixtures, not of their elementary components, but of chemical components of these elements with one another, associated possibly with uncombined remnants of these.

As the number and character of metallic combinations are infinite, differing not only in the number of component metals but also in the quantity of each, their systematic scientific study is difficult and their classification is rendered imperfect. That of Matthiessen is most satisfactory and intelligent for all practical purposes. He regards it as probable that an alloy is either (1) a solution of one metal in another, (2) a chemical combination, (3) a mechanical mixture, or (4) a solution of one metal in another—or all of the above.

Several of the metals when melted with each other unite apparently in the same manner as sulfuric acid mixes with water, in all proportions forming a perfectly homogeneous mixture with no tendency to separate upon cooling. Examples of metals combined in definite proportions frequently occur in nature, as, for instance, the native alloy of gold with silver, in which four, five, six, or twelve atoms of gold are found combined with one of silver.

The relation of the fusing-point of alloys to those of the constituent metals is variable, and cannot be anticipated theoretically. The fusing-point of an alloy is always less than that of the least fusible metal composing it, and often below the melting-point of the most fusible of its constituents. The curious alloys known as "fusible metal" illustrate this.

Color. Changes in color result from alloying metals, the product generally resembling that of the predominating metal. An exception, however, may be noted in an alloy of 3 parts silver to 7 of gold, which produces a greenish alloy used in jewelry and ornaments.

Conductivity. The conducting power of alloys for heat and electricity is inferior to that of pure metals. While great differences may exist between the physical properties of an alloy and those of the metals composing it, yet certain of the metals when present in an alloy confer upon it definite properties which are characteristic. Cadmium and bismuth increase fusibility, tin hardness and tenacity, arsenic and antimony brittleness.

Gold.

Atomic weight 195.7. Symbol, Au (aurum).

Gold is one of the few metals which is found in the metallic state, and one of the first known to man. Allusions to it are frequent in the Old Testament, and jewels and vessels found in Egyptian tombs afford evidence of the perfection attained in working it at a period earlier than the government of Joseph. There are many evidences that the processes of alloying, refining, and separating gold were practiced at a very early period of the world's history. According to Pliny, the metallurgy of gold was known in his day. Vitruvius also gives a detailed account of the method of recovering gold by amalgamation from cloth into which it had been woven. It was employed in Rome for the purpose of fixing artificial teeth more than three hundred years before the Christian era, and a law of the Twelve Tables makes exception with regard to such gold, permitting it to be buried with the dead. (Phillips' "Metallurgy.")

The great beauty of color and luster and the power of resisting oxidation which gold possesses have caused it to be valued from the earliest ages for the purposes of adornment and as a circulating medium.

Occurrence. Gold is of nearly universal distribution, and is found in nature chiefly in the metallic state as native gold. The native metal is sometimes found in the form of cubic crystals, in octahedra, and in more irregular and complex shapes called nuggets and dust. It is found in quartz veins or reefs traversing slaty or crystalline rocks, alone or associated with iron, copper, arsenical pyrites, galena, silver ores, and more rarely with calcium, tungstate, bismuth and tellurium minerals. Gold occurs in nature very nearly though never quite pure, being generally associated with silver. Other metals are occasionally found combined with it, but in very small quantities, and these foreign metals are peculiar to localities. Thus California gold, in addition to silver, which is always present, may contain iridium; Russian gold often contains platinum, and specimens of the native metal from Brazil will not infrequently be found to contain palladium. Gold is never found alloyed with copper.

Methods of Production of Chemically Pure Gold.

There are several methods by which chemically pure gold may be obtained. The aqua regia used in its preparation should consist of two parts of hydrochloric and one of nitric acid, the specific gravity of the former to be about 1.16 and of the latter 1.45. Each ounce of gold will require for its solution about three and one-half ounces of the mixed acids. The action of this mixture upon the metal will in the beginning be quite energetic, but as the solution approaches saturation, the application of moderate heat is required to dissolve the last portion of the gold. Care must be exercised in the separation of the gold solution from the argentic chlorid, which subsides to the bottom of the vessel; also to rid the liquid of the small portion of silver held in solution by the acid. The solution is cautiously transferred to an evaporating dish by means of a siphon, heat is supplied, and, as the bulk gradually is reduced by evaporation, more argentic chlorid will be separated and deposited at the bottom. The supernatant liquid should be again poured and siphoned off, and this procedure repeated as often as the residue appears. When the solution becomes viscid and of a deep ruby color, the heat is discontinued, and auric chlorid soon crystallizes in a mass of prismatic forms. It should then be dissolved and largely diluted with distilled water acidulated with a few drops of hydrochloric acid, and, after standing a few days to permit further subsidence of argentic chlorid, it should be filtered, when it is ready for precipitation. This may be accomplished by quite a number of different reagents, but the form of the precipitated metal depends upon the nature of the precipitant, and it may be thrown down in a spongy condition in sheets resembling foil, as a powder, in a more or less crystalline state, and in scales.

The highly diluted neutral solution of the trichlorid just described is quite liable to decomposition by dissociation. The best agents for the precipitation of gold are oxalic acid, sulfurous acid, and ferrous sulfate. Oxalic acid will precipitate several forms of gold from the spongelike masses to the different crystalline or powdery forms. Its action is, however, slower than that of the other reagents, and it requires to be slightly heated. The reaction is shown in the following equation:

$$2AuCl_2 + 3H_2C_2O_4 = 6HCl + 6CO_2 + 2Au.$$

The chlorin of the auric chlorid unites with the hydrogen of the oxalic acid to form hydrochloric acid, the copious evolution of gas noticed during the precipitation being due to the escape of the carbonic acid formed by the remaining elements of the oxalic acid. The gold is thus set free.

The so-called "shredded gold," which was somewhat extensively used by dentists in filling teeth during 1867 and 1868, was produced by the addition of sugar or gum arabic to an acid solution of gold. When precipitated gold is intended for a plate or bars, it should be well washed and fused in a new crucible. Sulfurous acid precipitates gold generally in the form of a scaly metallic powder, hence it does not afford masses sufficiently coherent or spongelike for use as a filling material for dentists. The reaction which takes place is thus explained:

$$2AuCl_3 + 3H_2SO_3 = 6HCl + 3H_2SO_4 + 2Au.$$

The water present is decomposed, its hydrogen uniting with the chlorin of the auric chlorid to form hydrochloric acid. The oxygen of the water attracted to the sulfurous acid converts it into sulfuric acid, and the gold is thus liberated.

Gold may be also reduced from solution by the electric current on a platinum pole. In this way the beautiful form of gold made by A. J. Watts of New York is produced. In a solution of auric chlorids, plates of pure gold are suspended. These are connected with a battery, so that, as the solution loses its gold by deposition of the metal, it is resupplied from the plate which forms the positive pole—the anode. By this means large masses of perfectly pure crystal gold may be obtained.

Gold remains unchanged in air and in water at all temperatures, and will not combine with oxygen. Until the researches of Mitscherlich showed that gold was soluble in selenic and iodic acids, it had always been considered insoluble in any of the simple acids. Aqua regia received its name from the fact that it was the only acid which would dissolve the king of metals.

Gold Leaf and Foil.

Gold designed for manufacture into leaf is variously alloyed, according to the color required. In filling teeth, nearly pure gold in the form of foil is used. The two varieties, cohesive and non-cohesive, are extensively used in the United States at the present time, but the methods of their manipulation are widely different. In the former, the characteristic quality of cohesiveness, which is greatly diminished by compression of the fibers in beating, is restored by heating to redness, and this is best effected by placing the gold upon a sheet of mica, which is held over a spirit lamp. The habit common among dentists of taking up the foil upon the point of an instrument or pliers and passing it through the flame is not productive of best results, as the gold is made harsh by contact with a flame, whereas, in addition to cohesiveness, it should possess some of the softness of the non-cohesive variety. Some of the manufacturers of gold foil produce a soft foil in which cohesiveness cannot be produced by annealing. This, however, may be attained by alloying, or by depositing carbon upon the surface, as this cannot be driven off by heating.

One manufacturer of dental foil states that he makes two varieties, cohesive and non-cohesive foil, from the same ingot. It seems safe to assume that the development of these qualities is due either to some surface treatment or to mechanical

management during lamination, and not to alloying.

The researches of Prof. G. V. Black, published in Dental Cosmos for 1896, show the influence of gases and moisture on the cohesiveness of gold foil. The merits of cohesive and non-cohesive forms of foil are often unfairly presented by their advocates, but the value of each may be stated as follows: "Cohesive foil in small pieces can, with an electric plugger, be brought into most perfect apposition with the most delicate walls of enamel with comparatively little danger of fracture; non-cohesive foil in much larger masses may, with much less expenditure of time, be introduced when the walls are sufficiently strong to withstand the force required to consolidate the mats or cylinders, and affords equally good results."

Dr. Kirk states that the feeling of softness exhibited by non-cohesive foil under the instrument is due largely to the fact of its non-cohesiveness, whereby the several laminæ slip and slide one upon another, thus conveying a yielding or soft sensation to the tactile sense, and making it possible to condense large masses at a time, the pressure being conveyed continuously throughout the mass, and the condensation being uniform. A similar mass of cohesive foil treated in the same manner and under like conditions presents a greater resistance to the instrument, and conveys the idea of harshness, owing to the fact that, as pressure is applied, the successive laminæ unite or weld together from the surface downward into a homogeneous stratum of metal, which offers greater resistance and becomes more impenetrable by constant additions to its thickness, until the condensing instrument fails to make any further impression. Upon removing the mass of gold, it will be found that the portion occupying the bottom of the cavity is still in the form of foil not homogeneously condensed.

Metal Workers.

In reviewing recently a work upon "Ornamental Arts of Japan," I was deeply impressed with not only the merit and beauty of the artistically conceived and executed designs in painting, wood and ivory carving, lacquer, and cloisonné enamel work of these people, but more especially of their incrusted metal work in bronze, gold, silver, copper, and alloys. One particular specimen of their art work in metal, of the class known as *syakfdo,* in which the Japanese are unapproachable masters, completely captivated my artistic sense and appreciation of the beautiful by the conception and execution of this particular design. It represented a superb specimen of this work, being a wrought-iron dish of some sixteen inches diameter, with medallioned center inlaid and incrusted with gold, silver, copper, and certain alloys. The face of the medallion was most expressively modeled in iron darkly browned, with eyes of silver and *shakudo,* the latter being an alloy of copper, gold, silver, iron, and antimony, teeth in silver, and tongue in deep red copper. The background of this dish was formed of damascened work of microscopic minuteness executed in *coban*—an alloy of gold 10 parts, silver 2.6 parts. Looking at this representation of their art in metal work and knowledge of metallurgy, one reflects, What may not be expected of such a people in the future, if their knowledge of this science, coupled with daring conceptions, deftness of hand, and masterful execution of design, are applied to dentistry? Past-masters as they are in such processes of decorative art as inlaying, damascening, champlevé, enameling and niello work, incrustations of metal by the Japanese are very common, and are invariably beautiful and highly artistic objects. The various colors of bronze produced by the Japanese metallurgists, and the skill with which these objects are cast, chased, and inlaid with gold and silver by native metal workers, furnish ample scope for the artists to display their ingenuity and taste. Upward of one thousand years ago the status reached by the Japanese in the art of metal fabrication was remarkably high, and many of the products of these early ages of art culture demonstrated a breadth of conception and a courage of effort that could

only emanate from an intellectual and energetic race.

It may be of interest to the gold inlay workers of our profession today, disciples of Taggart and others, to know that bells and bronze castings and all manner of intricate and beautiful inlay designs, first molded in wax models, were cast by the Japanese in the early part of the seventh century, more than seven hundred years prior to the discovery of America.

As metallurgists and art workmen in metals, the Japanese may safely be pronounced as unexcelled. As dentists we are specially interested in their knowledge of the properties of the metals and their alloys, and their skilful manipulation in works of utility and beauty.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE POSSIBILITIES OF RESEARCH INTO THE ETIOLOGY OF ANOMALIES OF THE JAWS AND OF MALOCCLUSION.

By Professor **JULIUS TANDLER**, Vienna, Austria,
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(Read before the Alumni Society of the Angle School of Orthodontia, at its seventh annual meeting, New London, Conn., July 29, 1913.)

WHILE fully appreciating the overwhelming results which have been attained in orthodontia within the last few years, we cannot but admit that the theoretical basis for the facts which have been practically confirmed is yet in many cases deficient. As in many other fields of medical science, therapeutic success has here anticipated the scientific argumentation. Our want of theoretic knowledge relates particularly to two points, viz: (1) To the knowledge of the etiological factors causing malocclusion; (2) To the knowledge of that formal transformation of the skeleton which we are enabled to obtain by therapy.

THE ETIOLOGICAL FACTORS OF MALOCCLUSION.

As to the first point, we have not yet advanced beyond the realm of vague supposition. Regardless of the fact that only a single reason would be given in supposing mouth-breathing to be an etiological factor in certain types of malocclusion, it should be taken into consideration that mouth-breathing itself, again, must depend upon certain etiological factors. Though we know that mouth-breathing originates by organic changes which obstruct the nasal respiration in some way or other, we need not infer, of course, that these organic changes must be of merely local nature, and do not rather represent partial symptoms of some general constitutional quality. Only exact researches into the constitutional idiosyncrasies of persons with malocclusion can elucidate this question.

Thyrogenic constitutional anomalies. We may mention here the high palate and narrow jaw in degenerated families, where it can hardly be assumed that we have always to deal with mouth-breathers; also the deformities of the jaw in thyrogenic constitutional anomalies, such

as are to be found, for example, in endemic cretinism. In these cases we have to deal with people who, although having absolutely flat palates, prove to be pronounced mouth-breathers.

Hereditary syphilis. However, not only constitutional factors, but likewise congenital diseases, such as hereditary syphilis, are responsible for the shape of the cranium and the jaws. Therefore it is open to doubt whether this determination of shape is a direct or an indirect one, whether the syphilis acquired *in utero* itself modifies the jaws, or causes the modification only by producing changes at the base of the cranium, especially at the sutures and synchondroses. The general diseases contracted in early youth, as, for instance, rhachitis, should be considered from a similar point of view. The rhachitic changes of the cranium and the facial bones without doubt determine the shape of the jaws, and consequently the occlusion.

These observations, which have already aroused our suspicions to a certain degree against the merely mechanical conception of the etiology of malocclusion, become the more justified when we see also that diseases of the central nervous system, which certainly cannot be the direct mechanical causes of some kinds of defective occlusion, are at least regularly associated with such anomalies.

Hydrocephaly. It is therefore more than probable that the transformation of the cranium caused by hydrocephaly only indirectly produces a change in the jaws. The entire question is rendered interesting by the circumstance that hydrocephaly, as a race quality, is always associated with quite a characteristic shape of the jaws. So we see, for instance, in the bulldog, the short muzzle, the broad, flat palate, and the well-known protruded mandible (*Progenie*) regularly associated with congenital hydrocephaly. For the moment it may be open to doubt whether hydrocephaly is really the original cause of the anomaly in the jaws, or whether they both are manifestations of a certain constitutional anomaly.

Influences of disturbed function of ductless glands. How important are the general points of view regarding particular organic changes, and including, therefore, anomalies of the jaws, may be deduced from the vast modifications which the jaws undergo when the normal function of some of the ductless glands is disturbed. We need only to mention here the abnormal function of the pituitary body in acromegaly, which is accompanied by an extraordinary growth of the jaws and separation of the teeth. This fact is all the more important since the extirpation of the pituitary body is followed by a diminution of the jaws, and consequent recovery from malocclusion. Here, certainly, it would not be correct to speak of mere local conditions.

Here may also be ranged the changes at the base of the cranium and in the facial bones found in individuals with thyrogenic processes. If the dentition in its later development really represents the expression of the normal function of glands with internal secretion (ductless glands), then, by the disturbance of these functions, changes in the dentition must be caused, accompanied, of course, by disorders in the development of the jaws and by malocclusion.

HEREDITARY NATURE OF MALOCCLUSION.

Starting from the principle that the shape of the jaws presents, like all other individual somatic qualities, a constitutional characteristic, then, according to the notion of constitution, the shape of the jaw of each particular individual is inherited, for constitution represents, as I have already mentioned elsewhere,* the inherited qualities of the individual. If, therefore, a man inherits from his parents a certain constitution, be it a normal or an abnormal one, he likewise inherits the shape of the jaw belonging to the respective constitution, and to this extent malocclusion proves to be of an hereditary nature.

Thus also can be explained the inheritance of a peculiar shape of jaw, especially when human families have been bred

* "Konstitution und Rassenhygiene," *Zeitschrift für angewandte Anatomie und Konstitutionslehre*, Band 1, Heft 1.

and observed during centuries. I should like only to mention the characteristically protruded mandible in the Hapsburg family, as well as the peculiar shape of the jaws in the Julian family, so far as we are entitled to draw any inference from the busts of this family of Cesars as they have come down to us. As far as the shape of the jaws and the date of dentition can be brought into relation, the heredity of the dates of dentition even can be employed in this sense. One can very often hear the assertion that the date of eruption of the first incisors has been hereditary in families through many generations. In the traditional case of the Mirabeau family, from which the well-known champion of freedom in the French Revolution descended, the children were born with their lower incisors already erupted.

"CONSTITUTION" VS. "CONDITION" IN MALOCCLUSION.

I consider the connection between the constitution and the shape of the jaws, on the one hand, and the resulting hereditary shape of the jaws, on the other hand, as most interesting, not only from a general biological, but also from the orthodontic point of view. The constitution of the individual is itself immutable. The somatic qualities, which are changeable and can be changed by surroundings, have been designated by me as the "conditions." The orthodontist is able to produce changes of the *condition,* but never can influence the *constitutional qualities* of the jaws.

As the terms "constitution" and "condition" are not easily intelligible in the sense mentioned without further elucidation, the following example may serve for explanation: By cultivation and training it has been possible to produce a certain breed of the horse, known to us as the English racehorse. As a result of its constitutional qualities, it possesses special adaptability for swiftness; this efficiency we call the racing constitution. Each English racehorse possesses more or less of this racing constitution. By training and feeding we can now increase or diminish the inherited, and therefore constitutional, racing capacity of any individual horse. But what we change in doing so is not his racing constitution, but his racing condition, and we therefore say correctly, a horse is in good or bad racing condition. In judging deformities of the jaws and malocclusion, one should therefore not only utilize etiologically the actual local factors, but should take the constitutional factors also into consideration. When we consider the above statements, an answer to the question as to the etiology of malocclusion does not seem to be altogether simple. The above-mentioned mechanical conception should not be entirely discarded, but we must be careful to accept as indisputable the hypotheses previously considered concerning the etiology of malocclusion.

STEREOGRAMMETRICAL REPRODUCTION OF FORMER STAGES OF DEFORMITIES OR MALOCCLUSION IN EVERY INDIVIDUAL CASE.

Whoever in future undertakes the examination of the etiology of malocclusion will have to consider the whole constitution of the individual. For an expert opinion of any particular case, a model or a profile and front view of the face will no longer be sufficient, but it will be necessary to determine the entire shape of the cranium and the analysis of its particular sections.

It must be admitted that the material for investigation is most difficult to obtain. And the difficulty of providing material from juvenile persons, on which the occasional phases of development not yet influenced by any secondary factors may still be observed, renders the anatomical investigation and interpretation of these cases impossible. But even the analysis of particular cases can provide us only with certain phases in the development of the pathological state.

Our knowledge of the processes, however, would prove to be entirely different if we had a method at hand for obtaining at any time during life an exact picture of the position of the jaws and teeth, as well as of the entire cranium. By means of the stereogrammetrical system

of reconstruction, based on stereoscopic Roentgen (X-ray) pictures, as stated by me some time ago, one can reconstruct plastically within a fraction of a millimeter the bones of living beings. It will also be possible, by this method, to reconstruct the jaws as well as the entire cranium, and thus to establish a collection of such reconstructions containing all kinds of anomalies.

Under the present actual conditions such a collection of anatomical specimens is out of the question, though, if at hand, it would serve to inform us about the anatomy of jaw deformities, and would provide a basis for following up the etiological factors. Considering, however, that by the stereogrammetrical method it may be possible to obtain from the same individual lifelike models of the jaws at certain intervals, it is evident that by this means we should gain a better understanding of the transformation of the bone during that individual's lifetime.

It is indisputable that pathological or constitutional peculiarities of the cranium exert an influence on the configuration of the jaws and on the bones of the face. But just as certain is the reverse process, viz, that by regaining the proper relations of the jaws and by re-establishing the normal functions by orthodontic measures, we are able to exert an indirect influence on the configuration of the cranium. This is best shown by the change in the nasal configuration and of the frontal angle, during and in consequence of the treatment of cases of class III (*Progenie*). Whether this can be ascribed solely to the regaining of the function, whether the muscles of mastication influence so powerfully the facial and cranial bones on which they arise, and in consequence the bones connected with them by sutures, so that there results an entire change of the cranium, or whether we succeed in influencing directly the bones of the base of the cranium by influencing the upper jaw, will only be proved by the method of reconstruction mentioned.

By this process also we shall throw light on the much-debated question, whether we are able, in cases of malocclusion (class II) accompanied by mouth-breathing, to obtain a flattening of the palate and of the floor of the nose by broadening the jaw, and in this manner get a free nasal respiration. The measurements thus far made for establishing these facts are absolutely insufficient. The question about the stretching of the vomer by flattening the floor of the nose, thus eventually influencing also the base of the cranium, heretofore assumed by some authors as hypothetical and by others as evident, will then find an indisputable solution.

There can be no doubt that this method of reconstruction will advance greatly the knowledge of etiology. After we are able to understand better the morphology and etiology of malocclusion, we shall also be able to perform the treatment with better prospects of full success. In addition to this we shall be able to follow and control our therapeutic operations.

RÉSUMÉ OF ADVANTAGES TO BE GAINED FROM THE STEREOGRAMMETRICAL METHOD.

In summing up the statements mentioned, we must first lay stress upon the fact that the etiology of deformities of the jaws and of malocclusion is not to be considered from any limited—*i.e.* local—point of view. Here, as in the whole of medical science, the individual must be examined as to his constitution in its entirety. The etiology of anomalies of the jaws may or may not have its local causes. The photogrammetrical method of reconstruction will enable us to settle the morphology of malocclusion, as well as to study the course of the changes. This study, in connection with investigation regarding constitution, the frequency of malocclusion associated with certain constitutions, etc., will clear up somewhat the question of etiology. It is to be hoped that thus we shall abandon the shifting sand of hypothesis, and be enabled to push on our way steadily upon the solid ground of real knowledge.

The corresponding researches made by means of the stereogrammetrical method will be carried out in conjunction with Dr. Albin Oppenheim, and will in course of time be published at full length.

ELECTRICITY IN DENTISTRY.

By Dr. I. N. CARR, Durham, N. C.

(Read before the Southern Branch of the National Dental Association, at its annual meeting, at Old Point Comfort, Va., July 22, 1913.)

IN order to practice dentistry today successfully, it is imperative that we have a broader theoretical knowledge of all that pertains to it, together with a more exact clinical skill than has been required of the profession in the past, for the reason that much more is now expected of us. The public is being educated up to the possibilities of dentistry, and demands more. The field of dentistry has been so greatly enlarged that many operations are now undertaken which formerly were turned over to the general practitioner of medicine. While this tends to dignify our profession and place it upon a higher plane than it has hitherto reached, yet with its advance comes the necessity for a broader and deeper knowledge on the part of all who essay to practice it. There is no such thing as standing still; we must either go forward or retrograde, and while this enlarged field of practice has added greatly not only to its usefulness to the general public, but also to the dignity of the profession and the compensation which it brings, it has at the same time necessitated more in the way of equipment to satisfy the advanced conditions and greater exactions.

COMPRESSED AIR FOR MOUTH-CLEANSING PURPOSES.

To my mind, no greater aid has been rendered the profession than electricity supplied through a good switchboard, by which the current is easily controlled. For several years we have been studying with more assiduity than ever before the pathological conditions and therapeutic treatment of oral diseases, and special study has been devoted to prophylaxis. Here electricity and pneumatics play a very important part. In the following I shall endeavor to point out some of the many uses which we can make of electricity in our daily practice. Let us see what help we can derive from an up-to-date switchboard and compressed-air outfit, and study some of the specific instances in which, as clinical experience has shown, this equipment increases operative efficiency, saves time and energy for the operator, and contributes to the ease and comfort of the patient. With the idea of sanitation in mind, when the patient takes the chair we first attach the compressed-air tube to an atomizer bottle and spray the mouth, throat, and teeth with a good antiseptic solution. The pressure used for this purpose is 15 or 20 lb., which can be easily regulated on the switchboard by a regulator. Suppose air has been pumped into the tank up to a pressure of 50 lb.; this amount can be reduced by means of the regulator to 5 lb., as is desirable for a spray bottle, or to any pressure below 50 lb. By spraying thoroughly, the mouth is rendered comparatively clean to operate in, which is certainly advantageous and pleasant to the operator, as well as beneficial to the patient.

COMPRESSED AIR IN PYORRHEA TREATMENT.

Besides spraying the mouth with the aid of air pressure, a gold point can be inserted between the teeth, and medicaments can be forced as far down and around the roots with as much air pressure as desired. I sometimes use from 40

to 50 lb. pressure in pyorrhea cases, washing out thoroughly all accumulations that may be present, thus producing a clear and clean field for instrumentation. After all deposits have been removed, the gold applicator is again brought into requisition, and all débris is forced out, after which one's favorite pyorrhea remedy can be applied with the expectation of good results.

USES OF THE HOT-AIR SYRINGE.

Another very valuable appliance to be used in connection with the switchboard is the hot-air syringe. By means of the transformer rheostat, the current can be regulated so as to produce a constant current of either warm or hot air. The air-regulator governs the pressure, so that a very gentle or a strong stream of warm air is furnished. When used instead of the old-fashioned chip-blower, this appliance is both sanitary and effective, and the degree of heat can be regulated to a nicety. It imparts an agreeable instead of a painful sensation to the patient when the chips are being blown from a cavity during the process of burring or excavating. Moreover, the use of the hot-air syringe while the dam is in place will reveal any decalcified spots in the enamel which the eye would not notice unless the tooth is entirely or nearly desiccated. An etherial solution of cocain applied to a desiccated tooth is readily taken up by the protoplasm in the tubuli of the dentin, which enables the operator to excavate almost painlessly. For drying out root-canals and vaporizing eucalyptus oil and iodoform, for instance, it is of inestimable service. In short, the many purposes for which this appliance can be utilized in facilitating the work and accomplishing the desired ends most effectually are nothing short of marvelous.

The hot-air syringe may also be employed advantageously when filling root-canals with gutta-percha points. After a point of suitable size has been inserted as far as possible, the nozzle of the syringe is held close to the protruding end of gutta-percha, which is softened with the hot air. The point can then be packed thoroughly into the canal, sealing it hermetically. It is also of great value for drying abutments in crown and bridge work, since the cement holds better and sets more quickly. The advantage of having at one's disposal at all times a constant flow of filtered air, under absolute control as to volume and temperature, is inestimable.

THE ROOT-DRYER.

Another valuable instrument is the root-dryer. This consists of a very fine, flexible silver point, which can be inserted to the apex of almost any root-canal, and dehydration of a canal to any desired extent is easily and quickly accomplished without danger of injuring the peridental membrane. The degree of heat is easily regulated from the switchboard. Patients are advised to lift the left hand as soon as the point becomes too hot; in this way all danger of overheating is avoided.

DIAGNOSTIC LAMP FOR EXAMINATION OF THE MOUTH.

For a thorough examination of the mouth and teeth the aid of a diagnostic or antrum lamp is invaluable. To use this lamp most successfully, a camera cloth is thrown over the head of both patient and operator. Its wonderful luminosity will reveal pulp conditions as nothing else will, and the proximal surfaces and interproximal spaces may readily be examined. A first-class radiograph could not show up conditions much, if any better. We can rely upon this lamp to reveal conditions as they exist, and we are thus enabled to apply our remedies more intelligently. For superficial examinations the mouth-lamp is very serviceable; indeed, I now use it almost to the exclusion of the ordinary mouth-mirrors.

THE ELECTRIC CAUTERY.

With the electric cautery many operations can be done painlessly and scientifically. An abscess cannot by any method be opened more thoroughly and

with less pain than by the quick application of the actual cautery. The platinum loop, when at white heat or incandescent, is practically painless, while a red-hot wire would cause pain. For removing hypertrophied tissue, overhanging cavity walls, and filling the interstitial spaces, it is unexcelled. It leaves no bloody trail behind it to interfere with the operator's work. Instead of using the lancet and curved shears for removing the tissue overlying painfully erupting third molars, we use the cautery, to much better advantage and with considerably less, if with any, pain. Its superiority over the knife and caustics will readily commend itself upon trial.

For stopping the exudation of blood serum from the gum margin, the flow of which would interfere with the placing of porcelain or gold crowns and bridges, the cautery is most excellent, and is unequaled as a time-saver.

OTHER VALUABLE ATTACHMENTS OF THE SWITCHBOARD.

Many other instruments and appliances are connected with a well-equipped switchboard, such as gutta-percha instruments, which can be kept at a certain temperature while packing this material into cavities, or around the pins in vulcanite work. The bleacher point is used for the volatilization of pyrozone and other bleaching agents, and accomplishes the work in very much less time than any other method with which I am familiar. The wax spatula is another handy little instrument, and very effective, as well as a time-saver.

All these and many other uses to which electricity can be put for facilitating dental work, amply repay the practitioner for the investment in an up-to-date switchboard and accessories.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

TRIGEMIN IN DENTISTRY.

By A. LICHTENSTEIN, M.D., D.D.S., Munich.

THE remedies which we may term as anti-neuralgics, analgesics, and partially antipyretics, have increased considerably in number within the last few years. Each of them is of some use; each subsequent product has been said to be better and to lack certain shortcomings of its predecessor. The fact that so many products have been placed upon the market shows that they were not perfect, and that it is not easy to take one's choice among them, if one desires to obtain results.

If I undertake the task in the following to direct the attention to trigemin, it is for the reason that I am of the opinion that it represents a good and efficacious remedy for our special purposes, and that although the product is known to some extent already, it has not assumed the place which it deserves.

TRIGEMIN IN GENERAL MEDICINE.

Chemically, trigemin is a compound of dimethyl-amido-phenyl-pyrazolon with butyl-chloral-hydrate. In the usual doses it has no disagreeable by-effects and no action on the heart or central nervous system, nor on the stomach or kidneys. We consequently have, in trigemin, a product almost non-irritant which excels by far the ordinarily used products. It is used to advantage in all painful affections in almost any field. In the literature we find reports of good results in coxalgia, sciatica, gout; the neuralgic pains of consumptives are

favorably influenced as well as the lancinating pains of tabetics, or the ciliary pains in cyclitis and acute glaucoma. It acts promptly in neuralgias of every kind, in migraine, and so forth.

TRIGEMIN AS AN ANALGESIC AND SEDATIVE IN NEURALGIA, PERICEMENTITIS, PULPITIS, ETC.

The analgesic and sedative effect of trigemin, however, manifests itself selectively in the painful affections of the direct central nerves. It has an almost specific effect in this connection which interests the dentist, especially in the field of the trigeminus. A great number of reports from dentists show the value of this remedy. We often have to deal with chronic periosteitis in teeth in which root-treatment has been completed, but in which from time to time periodontitic irritation returns. Renewed root-treatment may not improve the condition, but the patient wants to avoid extraction. In such cases the pain will readily be alleviated by trigemin, and the tooth will often be preserved for years.

Trigemin offers also good service in acute periodontitis and in acute pulpitis. If taken at night the remedy exerts a marked analgesic effect, and I have seen a good many inflammations of the pulp gradually disappear when for some reason or other the removal of the pulp could not be accomplished. In the majority of cases in which a devitalizing agent is sealed into a tooth, this procedure is very painful; and here again trigemin proves most efficacious, either by allaying the pain entirely, or by making it bearable. For a long time I have prescribed trigemin in such cases as a prophylactic by which all pain is overcome.

POST-OPERATIVE PAIN.

Furthermore, trigemin has established its value by alleviating post-operative pain. While the extraction itself can be easily done painlessly under local or general anesthesia, very often severe after-pain is felt in the empty alveolus. This can be promptly abolished by giving a few doses of trigemin. The painful eruption of third molars is alleviated by trigemin. The disagreeable sensation of pressure disappears, and if suitable local adjuvant treatment is instituted, the suffering, which often lasts for a long time, can be reduced to a bearable minimum.

Raphaelson found that trigemin lessened sensibility to pain in general, which is most welcome in dental operations, as in the grinding of teeth with vital pulps, in preparation for crown or bridge work.

INSOMNIA.

Trigemin has a good effect in insomnia due to pain, especially in irritations of the dental nerves; furthermore, in neuralgias of the dental and facial nerves. In chronic cases where narcotics have to be used for a long period, trigemin permits of smaller doses, either by combining it with the narcotic, or giving alternately trigemin and the narcotic.

To those who have not used trigemin, the above indications may seem rather extensive; unjustly so, however, since all the above-mentioned conditions arise from disturbances of the trigeminal nerve; and, since trigemin has a selective action on this nerve and its branches, its manifold uses are evident.

I have given trigemin for years in more than 500 cases, and I have found it to render better service than any other remedy, without causing any untoward effects. In dental practice we have constantly to deal with painful operations, and we cannot dispense with remedies which reduce pain or do away with it entirely. Of all the remedies which are intended for this purpose, trigemin is, in my experience, the most reliable, and should therefore rank among the indispensable stock remedies in the dentist's cabinet.

DOSAGE.

As for dosage, the capsules of 0.25 gm. are most suitable. In adults, I usually give 2 capsules as an initial dose. Very often no subsequent dose is necessary. If so, a few doses of 0.25 gm.

given at intervals of three hours, will produce the desired effect. Only in acute pulpitis and periosteitis is a second dose of 0.5 gm. indicated. Children are given less, according to age; mostly one-half of the above-mentioned doses.

THE TEACHING VALUE OF THE CLINICS AT DENTAL SOCIETY MEETINGS.

By CLARENCE J. GRIEVES, D.D.S., Baltimore, Md.

(Read before the Susquehanna Dental Association, at its annual meeting at Wilkes-Barre, Pa., May 20, 1913.)

HARDLY a week passes but there appears either in public print or voiced on some occasion a full share of favorable comment on the wonderful technique developed by all branches of the dental profession. It would appear that the American people have a natural pride in the accomplishments and skill of a profession they claim as their own. Never a native leaves his land who does not return to tell of the appreciation by the people of other lands of American dental knowledge and technique, methods and machinery.

The pleasing feature of the situation is that this praise—often fulsome and sounding egotistical, the eagle screaming the while—is really, or has been, to a degree merited; and every man who has the best interests of his calling at heart should individually strive that his profession shall continue to deserve these marks of approbation. We therefore consider timely some discussion as to just how this knowledge, these methods, these many instruments and the technique of their use, have been developed; in fact, a serious consideration of the subject is urgent if we are to maintain the reputation so freely granted us.

MODE OF INTRODUCTION OF NEW DENTAL METHODS.

Whatever may be said disparagingly, and ofttimes justly, of our science, no one has yet criticized our technique, and it is really remarkable that so many methods, always changing, ever new, should become in so short a time as the life-period of our profession the successful daily handicraft of nearly fifty thousand operators. In casting about for causes we find but three obvious channels for the teaching and dissemination of new methods, *i.e.* the dental schools; our literature, composed of the dental journals and of text-books—which are but compilations of well-tried facts appearing in the journals; and the many meetings of our dental societies, the proceedings of which are reported by the journals.

The modern dental school of the better class is the equal of any of the various colleges where a special technique is taught with sufficient science to equip the licentiate for a special life-work; but, with all of its wonderful facilities for developing a tedious and difficult technique, the dental school never originates methods or processes. Obviously, it would be foolish, if not damaging, to introduce the dental student to technical processes untried and untested; these should have no place in any curriculum, particularly when there is hardly time for instruction in the basal principles. So the dental school is not a means for the introduction nor the trying-out of new processes, no matter what its critics may seek to imply.

What is true of the school is even

truer of the text-book; no editor or publishing house would risk reputation, perhaps money, in presenting books the text of which introduced untried data. Someone has said, "The modern text-book is old before its pages leave the press." This should be true in a general sense, for it is to our text-books that we turn for assured, not experimental facts. So the dental association meeting, the journals which report it, and particularly the instincts which prompt these associations, are the factors to which we shall finally turn if we are to learn the primal causes for this quiet yet rapid spread of dental knowledge, and of the technical skill necessary in applying it.

DENTAL ORGANIZATION.

A word should be said, even if it sound trite, as to this wonderful power for advancement and learning of any true association. Antedating the first dental school, if not the first real dental text-book, the value of association and organization was recognized by a few broad-minded practitioners of the dental art in this country, struggling for a recognition which they foresaw was but dentistry's due in an atmosphere of charlatanism and jealousy, the locked laboratory and the secret process. These men recognized the stupendous teaching power of this desire, primal in entity, for contact with fellows of the same craft, by whom they could be understood—the chance to "swap" views, to discuss, to quarrel, to fight, if need be, for an opinion and make it all up in the good-fellowship afterward, and they profited by it. It was the promptings of this power which took Hayden and Harris, no longer young men, by arduous stage-coach journeys, again and again to New York City, there to meet their *confrères* from New England and Pennsylvania equally zealous for organization. Is it any wonder that in this association germinated the American Dental Society, and its mouthpiece the *American Journal of Dental Science*, and that from these grew a school and a profession.

And it is good to think that this same spirit still lives and prompts men of our profession; for, out of approximately 235,000 physicians in this country, less than 50,000, or a little less than one-fifth, are society members; while out of approximately 50,000 dental practitioners, over 16,000, or a little less than one-third, are in good standing in their respective societies. Comparisons are odious always, but these facts should be kept in mind when criticisms are heard of the value of dental associations.

VALUE OF CRITICISM.

Back of all this lies the fact that the practitioner of the healing art, particularly the dentist, is in a sense isolated; opportunity for consultation on the daily work with his fellows, the hourly privilege of the business man and lawyer, is rare, and frequently marred by jealousy and competition. For the very want and habit of it, criticism is not taken kindly by the dentist, who is "a rule unto himself." Such isolation, if not tempered by the opportunity offered by the dental meeting for the exchange of incidents of office practice, the give-and-take of the clinic room, will soon make a man "stale"—he smothers in his own office environment. Can there be a more sensitive, "bumptious" egotist than the dentist who has never had his methods questioned, his ideas squared, by the rub of a dental meeting?

PERSONAL ASSOCIATION.

The story was told long ago of an American, an Englishman, and a Scotchman who were wrecked on a desert island. The American, it was said, immediately introduced himself, the Englishman waited to be introduced, and the Scotchman got them all together and formed a St. Andrew's Society. So, primarily, the greatest good which may accrue from dental associations to the average attendant is not so much from papers and clinics and discussions of both, valuable though they may be, but from the personal contact of individual overflow meetings, "where two or three are gathered together" to discuss the discussers, so to speak. This sentiment

is aptly expressed by a friend, whose avowed procedure for obtaining information had been to get the essayist or clinician quietly away—around a table, perhaps—after his effort, and pertinently say, "Now cut out all the trimmings, and tell me in a few words what you are driving at, anyway," and it usually brought the answer.

PROBLEMATIC VALUE OF PAPERS AND DISCUSSIONS.

With no disposition to belittle the educational value of papers and discussions—for they bear the same valuable teaching relation to our science that the clinic is here claimed to bear to our technique—the judgment of the average member of dental societies is that the flow of new thought as presented in the rapid reading of a research paper is much too fast for his mental assimilation. Perhaps he is glad and proud to be present. He may decide that it is all "over his head," and escape to play golf or look the town over. In any event he makes the mental note that the proceedings are quite scientific, and that he will read the papers and digest them at his leisure when published. This explains the tendency to forego the more elusive, though not the less valuable, scientific features contained in the paper, to hurry off to the exhibit and clinic room where he can "see the wheels go round," or watch the operation grow and learn "how" it is done and "why" it is done at the same time.

It has become the fashion to deplore this so-called lack of scientific interest on the part of the members of dental organizations, and perhaps these critics are right, but they should have begun practically years ago in the early training. It is foolish to expect men to reach rapid-fire conclusions as to scientific essentials when they have not been grounded in the fundamentals.

POPULARITY OF CLINICS.

In the meantime, the average member, like the poor, is "with us always." Dental associations need more of his kind, and must make it interesting for him. So we believe the majority have "found themselves," and know what they want, and are right in this increasing, untiring demand for clinics and demonstrations. Half of any lesson is already taught if the pupil really believes in, and selects, his own method of learning. Our members think they learn more through clinical teaching than in any other way, and it is the part of wisdom to let them learn in their own way. Just as the didactic lecture, as a means of teaching, is gradually disappearing from the dental schools to be replaced by the small class, recitation, and clinical methods, so it would seem that the majority are right, in a degree at least, in discarding the paper for the clinic. This not to be misinterpreted as a movement hostile to the essay; it is simply a claim that technique can only be taught by technique—an axiom as old as manual training.

SCIENTIFIC BASIS OF ALL CLINICS.

The fault lies not in the ever-increasing demand for clinics, but in the fact that the clinic has not been recognized as the one greatest teaching unit in our hands today. It should be fostered, not condemned as "practical," hence unscientific! Dr. Kirk has his quarrel with this use of the word "practical" as implying something not related to science; he has shown that nothing can be really practical which is not based on the purest science, though the science may not be apparent. Especially is it important that this fact should be kept continually before the dental operator, all whose operations are practical in this sense of the word, yet none succeed unless anchored in absolute science. We hear the average man depreciatingly assert that he is "not a scientist, but just a practical man"—meaning possibly that he acts empirically, and cannot always tell "why," even if he knows "how" to do a certain thing. He persists in seeing science as something afar off, too high for him, even while it is making for the success of the operation under his fingers every day. A clinic is never successfully presented unless the causes for every

step in the operation are given with the method of operating, and if a group of listeners can be convinced of the reasons for the operation as the technique is demonstrated to them, these "practical" men are being taught science without their recognizing it or being "bluffed" by the term "scientific," and they are being taught in a way never to be forgotten. Later, when the science is assimilated, the self-styled practical man will take himself more seriously, even at the risk of being dubbed a "pseudo-scientist," which will not hurt him. The writer has been so styled on one occasion, and lives to tell of it.

The management and arrangement of the clinic even of a small dental meeting is thus shown to carry with it a greater responsibility than the preparation of all the rest of the program. It would be far better if those managing such meetings, instead of criticizing the majority of the members, whom they serve, would recognize the clinic as the greatest possible opportunity for the dissemination of science, along with the method of applying science, among the greatest number, and would look well to the type of clinician and clinical event.

DISSEMINATION OF INNOVATIONS AND CONFIRMATION OF APPROVED METHODS BY CLINICS.

Even as the matter now stands, every clinician is instinctively a teacher. He has some idea which he is convinced is original. He is enthusiastic and impressed with the value of his message to his fellow practitioner and to humanity. He is disinterested, for all he wants is an appreciative hearing and commendation from the crowd if he is right. He has come, sometimes, miles from his home at a personal loss to deliver this message. This is the tremendous teaching force which has done such execution in the past, all unguided and in a haphazard way. All of the new processes have thus been introduced, the diligent society member hunting around the clinic room for such events.

A moment's retrospect will convince each of us that there is hardly a dental operation performed today as it was by the graduate of ten years ago. Double this period, and those of us whose services were "anxiously awaited by the suffering public" have changed every operation we do again and again. Where were we taught all these changes in our office practice—life being too busy even for devoting time to a course in a postgraduate school? There can be but one answer. It was in the clinics of our local, district, state, or national meeting. It is safe to say that never a week passes without two or more of such meetings occurring all over the United States. The text-books of twenty-five years ago attest this fact and reflect the period showing the great change. The authors of these books and the teachers who use them had all that is new in those published since, threshed out and proved at dental meetings. So the clinician at the dental association teaches the teacher his technique; who in turn, if he approves, teaches it in the school; and if, as has been frequently said, a grave responsibility rests with the school in its product, the graduate, a much graver responsibility undoubtedly rests with the management of the clinic.

The diploma of one of the oldest universities of this country, supporting medical and dental departments, reads not only "to practice in his profession," but "to practice in and to teach his profession." This is the very highest privilege—to make the clinic room into a postgraduate school, if only for a day or the period of the meeting, with all of the order and precision of the school, to let the members think and behave as if at school; to impress the clinician with the idea that he teaches classes—to have him do and say the same thing again and again, to let him assemble his class at chair or table, to teach the lesson, and to move them on so that others may learn. If he realizes that his is really teaching, there will be the self-respect of a lesson really taught added to his enthusiasm for his original method and the courage of his convictions, a truly wonderful teaching element, far exceeding the humdrum methods too often habitual with college faculties.

It is not only as a medium for the introduction of the new and original that the clinic displays its greatest virtue; its teaching value can and should be applied to the process or operation which has become so commonplace as to be in danger of degeneration owing to slovenly methods; it should be applied to methods introduced but not fully developed; to the teaching of the obviously easy, hence neglected, at the clinic chair and table, such as the tying of ligatures, the application of medicaments, the working of amalgam and adaptation of gold, the articulation or the repair of a denture, etc. Commend the writer heartily to the clinician who will give a clinic on amalgam or gutta-percha fillings!—we leave his chair with the sense of a needed lesson well taught, even if we do not admit it.

SOME TIMELY ADVICE TO OBSERVERS OF CLINICS.

This type of clinic upon the everyday work is usually greeted facetiously or with scorn by the unthinking member looking for the new and disappointed at not finding it. An older member will wither an enthusiastic young clinician working on some "little trick" by the remark, "Why, I did that before you were born." A man who chronically gives clinics on the same subject is hailed with, "Say, Jones, don't you know anything but porcelain inlays?" There is nothing more discouraging; if the clinician lacks stamina, he will pick up his instruments and leave, but if he has grit he will get mad and keep at it from sheer stubbornness.

Why, in the name of Harris and Hayden, should not a man who can do porcelain or amalgam, or anything worth doing, better than anybody else, be allowed to teach these processes again and again to the fellow practitioners even of his own town, instead of being prodded to produce something untried maybe not half so well? If the members will look on the clinic as a training school to be taken seriously, much good is bound to result. As an observer and clinician of some experience, the writer admits that there is apparently need for the general circulation at the dental clinic of a tract on "Behavior." While the contents of this brochure would basally follow the "golden rule," it might be entitled "A Member's Whole Duty to His Fellow Clinician," or "The Unhappy Fate of the Willing Work-horse." The following headings, with exceptions to those in this presence and apologies for the vernacular might be profitably arranged thus:

Do not "hog the whole game." The clinic lasts but two hours; move on and give all a chance. Remember that, even if the clinician's expenses are paid by the society, he probably is losing more money at home than you will ever make from his ideas; treat him gently.

Do not be hypercritical; the clinic chairman may get *you* sometime.

The patient, even if it be a manikin or cast, is worthy of some consideration.

The clinic chairman knows a great deal; he admits it; but he is not a bureau of information.

If all the clinician says is old to you, do not tell him so, but move on. Did it ever occur to you that Sunday-school lessons are the very oldest things to all of us, but have we ever mastered them yet?

Never give a clinic at the clinician's table with the clinician's specimens; let him give his own clinic.

Beware of "Greeks bearing gifts" on the clinic floor. The ethical clinician has nothing to give but his brains; he represents no business house, but a desire to teach you; so be thankful and be taught.

If you are convinced that the clinician is wrong, call him outside *after* the clinic, and tell him so; he may there convince you that he is right.

There can be but few original clinics or papers produced each year, no matter how fertile the field; genius is rarely prolific, and always doubtful of the permanence of its actual doings. The great Pasteur in the most trying period of his life-work remarked, "God grant that by my persevering labor I may bring a little stone to the frail and ill-assured edifice of our knowledge of those deep mysteries of life and death where all our intellects have so lamentably failed." The demand for the new, the call for the novel.

the bizarre process, has its place in the clinic, as has been shown; but too often it tempts men into demonstrations of unripe methods which will not stand the test of time and experience. No new process is ever at its best, and there is always improvement by another than the discoverer. In the interim between discoveries it would be well to perfect our technique of what we have obtained from clinics on the commonplace, the everyday. If we are assured that much profit has been derived from the clinics of the past, it remains to define some means by which they may be bettered in the future.

BETTER ARRANGEMENT OF CLINIC PROGRAMS NEEDED.

It is the writer's firm conviction after considerable experience that the first great prerequisite to be added to what has been said is some classification of the different events other than the usual chaotic plan of chair and table clinics, and a more definite order in arrangement. A classification is always appreciated. It saves the member time and trouble. With the help of a program, a clinician should be just a little easier to locate than an obscure painting in an art gallery. It is so easy for the clinic chairman to begin this classification by tabulating the clinics as they are obtained, by the card system; for instance, under the heading Operative Dentistry are classified, without regard to chair or table—plastics, gold fillings, inlays, gold and porcelain, etc. These are again subdivided into—inlays (gold), cavity preparation, direct and indirect methods, impressions and wax forms, casting and metals, setting and finishing, etc. Porcelain inlays should be subdivided in the same order. Not until the list is closed should they be finally arranged and numbered in sequence on the proof for the program. The member can then go down the line and study the subject as he would a text-book, in its correct relation.

It is well in soliciting clinics to have this plan in mind, and to request several experts in certain lines to take up phases and steps of the same subject, and to teach that particular phase alone. This has been put in practice successfully. Modern orthodontia, for instance, outside of a school or two, has been taught for the past few years to the bulk of dentists entirely under the broad heading Orthodontia by specialists in that line, and with no order but that of "chair" and "table." Let the clinicians in orthodontia be solicited by letter, asking them to take up some definite phase of the question; then all the clinicians on classification and diagnosis can be put together, as can the making of casts, different appliances, fixed and removable, retention, etc. It is this sequence of events which really teaches, for the member does not lose the trend of thought in hunting up the next event in some other part of the room. Each clinician in his letter of acceptance should be requested to give a brief synopsis of approximately what he proposes to do. This should be filed on the card with his name and clinic title for study—first, by the chairman of the clinic committee, who should know just what type of event he is presenting to the society; second, these cards must be studied in open meeting by all members of the clinic committee, so that on clinic day they may act as guides and be able not only to locate any event for the inquiring member, but to tell him what he may see and how he may see it. To this end, clinic committees should be much larger for service on the floor.

DEFAULTING CLINICIANS TO BE BLACKLISTED.

It may be objected that clinicians will not be willing to teach one step of a subject, but it can be answered that, whenever this plan has been followed, the results have been good, as in Dr. Weston A. Price's "progressive clinic" in the Ohio Society. A much more serious objection to this plan is the embarrassing gaps in the sequence of events occurring at the last moment, calling for rearrangement of the whole clinic room, caused by the reprehensible absence of men who promise to give a clinic and do not keep their word. This is the most trying feature in the development of any dental meeting, apt to dampen the ardor

of the most enthusiastic and hard-working committee. The experience in soliciting and delivering clinical events in the past has been that, after a most careful canvass has been made by a series of three letters, and after affirmative replies have been obtained accepting the invitation and stating the title of the clinic, even after the expressed wants of each clinician, from a glass of water or a blowpipe to a patient for a cleft palate operation, have been catered to, the absent clinicians will total from one-fifth to one-third of the entire program. Some of the absentees are actually detained, some have thoughtlessly allowed their names to appear on the program, others accept and come to the meeting, with no idea of working; but the vast majority, to their shame be it said, had no idea of working anybody except the clinic committee to the tune of a little cheap advertisement! A careful study of the programs of the larger meetings for several years will show these types, the same crowd of hard-working ethical clinicians, and the same band of happy advertisers. Something must be done in this matter. A black-list of the chronically absent could easily be compiled from the programs of these meetings and placed in the hands of the clinic chairman of every state and national meeting. These men should not be invited. But just try it, "Mr. Chairman," and see how quickly you will receive a proffer of a clinic; accept the event as "padding" if you must, but remember it is not how many clinics you list, but how many you deliver, that counts! In this direction it is a most hopeful sign that many committees of the larger meetings are refusing all clinicians whose subject is "to be announced." This has been a favorite method of "padding" in the past. As the chairman is responsible for the type of each event, obviously he cannot know that type when the "subject is to be announced;" usually the announcement is about all that ever happens.

PURELY SCIENTIFIC CLINICS WANTED.

It has always seemed strange that the clinics of our societies should not be given on other than the so-called practical subjects. Why should not a series of events be included on much that the practitioner has done as a student and forgotten, or possibly never knew, with no object in view but abstruse science? Why should we not have clinics, for instance, on laboratory processes in histology, pathology, and bacteriology, the use of the microscope, the preparation, staining and mounting of sections, making of cultures, etc.?

There is no good reason why teachers from the various departments of our schools should not, with profit to the members, be called to give short courses in all branches. Is there any greater need than that we review the rudiments again and again? The study club idea for pure science' sake, if fostered by dental associations, will do much to repair the appalling blanks in our early professional education. This method has already been applied with great success to the everyday work, the society as a whole resolving its proceedings into a postgraduate school for one week under the instruction of two or three imported specialists eminent in their respective lines.

SCIENTIFIC EXHIBIT WANTED.

A further valuable adjunct to the teaching value of the clinic would be the founding of a scientific exhibit along the lines of that of the American Medical Association. This exhibit is a display of all phases of practical and applied science in anatomy, chemistry, materia medica and therapeutics, pathology, radiography, etc., the member who has really done his work explaining his charts and specimens.

COMMERCIALISM A DANGEROUS AND DELICATE PROBLEM.

In the foregoing much has been said of the value of the clinic room for teaching, but we must be careful that the lessons learned there are all professional and ethical, and not commercial. The very appearance of commercialism should be avoided in the clinic. The manifest injustice of placing a member who has come from afar at some sacrifice, with no

other interest than to give freely something original in the clinic, next to the man with the pocket-book interest in what he is showing and who is using the society's program and clinic floor to present if not to hawk and sell his goods, is the smaller part of the damage done; for the whole profession suffers reflexly in lowered tone every time such association occurs, and the members are apt to wonder, as they see these events, why they, too, cannot profit financially by their own brains. This is a very delicate subject, and, for the clinic chairman, discrimination is most difficult; he cannot question the motives of the man who offers to give a clinic on a salable device, remedy, method, etc., for this clinician may have no object in view but the introduction of what he thinks to be of benefit to his brother practitioner. On the other hand, he may simply be an advertiser. The clinician's financial interest in the article in question, therefore, can be the only basis for a correct conclusion. Our stand on this whole question must be tempered by liberality and sober judgment, and yet we must protect our professional birthright from this commercial mess of pottage. Too often we assume the attitude of the old gentleman in one of Europe's famous courts who remarked, "We may not be any better than our neighbors across the water, but, thank God, we don't admit it!"

THE VALUE OF THE MANUFACTURERS' EXHIBIT.

Many of these salable articles are valuable to the dentist who must have his opportunity to see new instruments and apparatus in a well-managed trades exhibit. The exhibit room is the commercial exhaust-valve of every dental meeting; it furnishes the opportunity for the chairman to clean up his clinic by inviting all those commercially inclined to take space. It has been noted on more than one occasion, where the exhibitor was debarred or severely restricted, that the manufacturer would see to it that his goods were represented at the meeting anyway, often directly on the clinic floor. So long as the dentist uses instruments and materials, the manufacturers' exhibit will be a valuable adjunct to every dental meeting. The American Medical Association encourages the manufacturer to exhibit, and its members consider their time well spent there in the study of new apparatus, medicaments, instruments, processes, and books, and it is hoped that we have not gotten so far above our calling as to despise its foundations, which are just as much mechanical and technical as they are medical and surgical. The great independent manufacturers' exhibits should be at once a lesson and a warning to all those interested in the welfare of dental societies; they attract a tremendous attendance by combining a pleasing exhibit of the instruments to be sold, with the clinic which demonstrated its utility. The busy dentist can afford but a limited time, frequently a part of his vacation, to attend dental meetings. He very wisely feels that he must see the latest in machinery, furnishings, apparatus, and instruments, and he is very apt, particularly if located in a small town, to take a part of the time which he would otherwise devote to the society meeting, and spend it at the manufacturers' exhibit. If a good trades exhibit is furnished at every dental meeting of size, he will profit by both, and ignore the independent exhibits—which will make him a better man both professionally and ethically.

DISCUSSION OF CLINICS ADVOCATED.

Last, but by no means least, arises the question of the value of the discussion of the clinics. While a paper with its discussion can be reported, it is most difficult to report and describe a clinic, no matter how liberally illustrated. A clinic is something done, something seen growing under the operator's hand; it is only the trained master-builder who can construct even from specifications and drawings, and sorry indeed would be the result if all the members were asked to do the simplest dental operation from the clinic report—which, after all, serves only for reference. All of this goes to show the importance of a period, well

defined on the program, for the discussion of the clinical events while they are fresh in the minds of those who have seen all the operation. Particularly those who have heard and seen but a part of the demonstration, and wish enlightenment on various other points, would profit by such a discussion.

"Discussion," says President Wilson, "is the greatest of all reformers. It rationalizes everything it touches. It robs principles of all false sanctity, and throws them back on their reasonableness. If they have no reasonableness, it ruthlessly crushes them out of existence, and sets up its own conclusion in their stead." So the discussion of a clinic is of as great a value as the discussion of a paper. Just as members are assigned to discuss papers, so the clinic committee should have the privilege of appointing one man at least to stand by each clinic as it progresses, and be the first to speak to the question after the clinician has made his report; this should be done in no perfunctory way, as is too often now the practice, but be incorporated in the proceedings of the meeting.

SYPHILITIC ORAL LESIONS.

By A. D. WEAKLEY, D.D.S., Washington, D. C.

(Read before the union meeting of the Maryland and District of Columbia Dental Societies, at Washington, D. C., June 12, 1913.)

THE subject of objective diagnosis of syphilis is a large one, and much has been written on it. The word "syphilis," however, is centuries old, the designation "venereal" being derived from Venus, the goddess of love.

We shall have to consider this subject under two heads, viz, inherited and acquired syphilis, both of which are interesting from an oral standpoint.

INHERITED SYPHILIS.

First we will consider the stigmata of inherited syphilis: It is an accepted fact that the devastating effects of syphilis on all tissue are most active during the last three months of intra-uterine and the first three months of extra-uterine life. Thus we find the stigmata of this disease so clearly marked on the teeth that are formed during this period.

In most of the articles dealing with this subject the peculiar markings on the teeth are called "erosion," but this is hardly an accurate term, since, in order to be eroded, the organ must have existed, which is not true. Neither is "atrophy" an exact term, for the same reason. The most exact term appears to be dystrophy, or impaired growth. (Joseph Cavallaro, D.D.S.) This dystrophic condition is shown either in the imperfect development of the enamel, which is pitted in many cases on both the labial and lingual surfaces of the centrals, laterals, and canines, and in the faulty development of the molar cusps. The distinctive syphilitic Hutchinson notches are always found in these teeth only—namely, the centrals, laterals, canines, and first molars. The reason the other teeth never show these stigmata is that the first molars are calcified during the sixth month of intra-uterine life. the centrals during the first month after birth, and the canines during the third and fourth months after birth. This explains why the bicuspids and the second and third molars never bear the stigmata of syphilis.

It was in 1857 that Dr. Hutchinson designated the symptom that bears his name. "Hutchinson's teeth," when first

erupted, are marked by a heavy cuspal crescent, which bears an appendix of weak tooth tissue, but this appendix soon wears off, and a crescent-shaped cusp remains. In these cases the enamel of the first molars is very poorly developed, part of the tooth being entirely free from enamel, having only dark brown patches on the surface.

Not all pitted or so-called eroded teeth are syphilitic. The scattering pits and the up-and-down lines of erosion are found following illness of the parent or child during the six months referred to, but the regular lines or pits running transversely are true syphilitic marks.

ACQUIRED SYPHILIS.

As to the acquired form of syphilis, we have three well-marked stages, the first and second being marked by the appearance of ulcerative suppuration and disappearance of the chancre. The third is the inactive stage. The chancre, or ulcer, as found in the oral cavity, is of prime interest to us dentists. In the accompanying table, ten differences between carcinomatous and syphilitic ulcers are given, which may guide the dentist in his diagnosis.

If a patient presents a lip or mouth showing the given symptoms of syphilis, it is our duty to send a section of the growth at once to a pathologist, who in the combination of the Wassermann and the luetin tests has a practically sure way of isolating spirochetæ pallidæ, the bacteria of syphilis. In case of a positive diagnosis, the patient should be at once put in the hands of a physician who makes a specialty of systemic treatment of syphilis. The most advanced treatment consists in the use of salvarsan ("606") or neo-salvarsan ("914"), which stand as a monument to the persistent efforts of Dr. Ehrlich of Frankfort, Germany.

The reason we dentists have a great responsibility in our practice is that, while the primary lesion or chancre is usually found somewhere in the pubic region, and in these cases of sexual infection is readily recognized as serious by the patient, the primary lesion as appearing in the mouth or on the lip is not suspected by the layman, and is consequently often neglected, to the grave detriment of the patient and of those with whom he may come in contact.

COMPARISON. (N. H. Meyers, D.D.S.)

Syphilitic Sore.	*Epithelioma.*
(1) Lips of women, seldom men.	(1) Men, more frequently than women, between the ages of forty-five and fifty.
(2) Lymphatics involved, before ulcer is formed.	(2) Ulcer formed before lymphatics are involved.
(3) Hard base of chancre will disappear in a few weeks under anti-syphilitic treatment.	(3) Cancer always presents a hard base, and the ulcer never heals entirely.
(4) Ulceration follows induration.	(4) Induration follows ulceration.
(5) In syphilis, one or more ulcers are formed.	(5) In cancer one ulcer is formed.
(6) Ulcer is found on the back of the tongue, tonsils, and palate, the primary stage excepted.	(6) Ulcer is found on the side of the tongue usually, but more frequently on the anterior than the posterior portion.
(7) Glands are rarely enlarged.	(7) Glands are nearly always enlarged in cases of long standing.
(8) Ulcer has softer but sharp edges.	(8) Ulcer has hard edges.
(9) Ulcer gives little or no pain.	(9) Ulcer is very painful.
(10) Ulcer raised with unbroken, flat top.	(10) Warty growth with a broken, inflamed, cauliflower-like surface.

ORAL PROPHYLAXIS.

By E. S. FILBERT, D.D.S., Pottsville, Pa.

(Read before the Susquehanna Dental Association, at its annual meeting, Wilkes-Barre, Pa., May 20, 1913.)

During the last decade the dental profession has begun to awaken to a realization of the duty which it owes the general public and of the wonderful amount of good which it can accomplish by practicing the principles which tend to health.

It is not so many years ago that we first took cognizance of the really filthy conditions that existed in many oral cavities, especially of persons of the less fortunate class; and today we find that great movement traversing our country as the Oral Hygiene movement. To be more explicit, it was in 1820 that "preventive dentistry," as well as the matter of "oral hygiene," became a well-established practice of the enlightened dentist.

DR. PARMLEY'S VIEWS ON ORAL HYGIENE.

To quote from Dr. Parmley, who lectured rather extensively, not only among the profession, but also to the laity:

The advantages of cleanliness to the well-being of animal life are too obvious to require illustration, and the influence it exerts on contagious and various other diseases is more than a sufficient groundwork for this position. Since it applies no less as an axiom to local than to general circumstances, those important instruments of the animal machine, the teeth, demand its fullest exertions; for these, when disordered, produce the seeds of constitutional disease.

The teeth are alone the cause of this dangerous attack on health and existence, and they display an influence no less serious at an after-period when they become diseased. Hence we should bear in mind the care that ought to be taken of this important part of our frame. Nature, to guard the teeth against disease, has placed them as extraneous bodies, and it is only from neglect in allowing their structure to be acted upon by what ought to be removed, that disease occurs. But the healthy condition of the teeth is necessary even to the perfect exercise of our senses, in consequence of their connection with the nervous system. The secretions of the mouth furnish a stimulus to the nerves which excite the sensation of taste, and these form an intimate communication with those of the organs of hearing, of smell, and of vision. This view alone should establish the importance of preserving the mouth and its apparatus in a healthy condition, the better to derive, through the use of our senses, the full and perfect enjoyment of life from every surrounding object presented to them. In a vitiated state of the mouth, where the secretions are loaded with disease and impregnated with noxious matter, the offspring of uncleanliness, the general feelings are annoyed to such a degree that the individual is often in a manner deranged. In that state, can the palate convey the proper sensation of taste? Can the olfactory nerves receive the free impression of pleasing odors, or the ear be duly acted on by sound? Thus a want of cleanliness counteracts the harmony of the system, by which the growth of the child is unprosperous, and the senses do not receive that full evolution which they would have made if not thus restrained. Since in childhood the first sufferings begin, in childhood also the foundation of a good or of a bad constitution is laid.

Thus the proper treatment of the teeth, when properly considered, forms the foundation of happiness. First, as the prime strengthener of the constitution: secondly, as the means of extending the growth; thirdly, as the sure foundation of health and harmony in the system. All these facts are important reasons, then, for early attention to the teeth and the natural organs connected with them, for it is principally in childhood

that the means of preserving them perfect can fully succeed, before the evil commences. The preservation of the teeth and gums, therefore, is one of the first objects to be studied for insuring health and strength. As they form by nature a complete arch, the removal of a tooth destroys the evenness of the gum and the alveoli, diminishing the strength of the jaw and proportionally reducing the perfection of the voice and articulation.

From this quotation it can be readily perceived that oral prophylaxis was a very live issue among the discriminating dentists of that day. Is it any wonder, then, that we, who have profited by their knowledge, should push forward the battleflag of oral prophylaxis to a victorious ending? It is the duty of everyone to be concerned that all matters pertaining to this most important subject should be spread broadcast, so that all may know the advantages to be derived therefrom, and that we, individually, may profit by that cleaner atmosphere which would encompass all mankind.

PUBLIC HEALTH AND CLEAN MOUTHS.

This subject is not only attracting the attention of the profession, but even corporations—in some cases being compelled by law, and in others voluntarily—are enforcing prophylactic means, as appears from a recent order of the Pennsylvania railroad regarding the dining service. The substance of the order was as follows: "All persons connected with the dining service, whether cooks, waiters, overseers, those in charge of the linens, on the trains or at the supply stations, must pass a medical examination, monthly, of 100 per cent."; in other words, the railroad wishes to make the dining service strictly first-class by having all food served in a strictly hygienic manner, that it might be said of them that they are doing their duty to the public as regards health.

It was my duty to examine the mouth of a suffering patient during the latter part of April. The patient informed me that she was working in one of the cafés of the city. Her mouth was reeking with filth, and we shudder to think of the poisons that are being thrown off from a mouth of this kind.

This subject is being neglected by too many of our thinking *confrères*—principally, I believe, because the cleansing of the oral cavity is an operation that consumes too much time without proper remuneration. Yet every practitioner should realize that "The day for 'Prevention!' is dawning, and those who do not heed the cry of the people will be found in the rear ranks." The necessity for the care of the oral cavity is greater than is generally supposed, as a clean mouth is a very great aid to the general well-being of the human body; for surely everyone will agree that, when one has a clean oral cavity, the general health should be good.

SOME AUTHORITATIVE OPINIONS ON THE IMPORTANCE OF ORAL HYGIENE.

Professor Osler says: "You have one gospel to preach, and you have to preach it early and late, in season and out of season. It is the gospel of cleanliness of the mouth, cleanliness of the teeth, cleanliness of the throat. These three things must be your text through life." Oral hygiene, the hygiene of the mouth!—there is not one single factor more important to the public in the whole range of hygiene than that, and it is with this that we practitioners of dentistry have to deal. Its object is to place the mouth in as clean and healthy a condition as possible. The health of the entire body depends on good teeth and sound surrounding tissues. How can we expect to have a perfect stomach and digestion with a mouth reeking with infection? Since every particle of food, as it is masticated, is mixed with saliva, and then passed into the stomach and the intestines to be assimilated by the system for maintaining life, the best nourishment from food can be had only when the saliva is pure and the teeth and surrounding tissues are clean and healthy.

Sanitary reform is being introduced in every other field; why should not sanitary measures be taken in regard to the mouth and teeth? Not one person

in twenty, after the age of thirty, has his mouth in a healthy condition.

Let me quote the opinion of men who know. Stomatologists claimed years ago that neuralgia, nervous headache, and many other systemic troubles, especially indigestion, had their mysterious origin in a foul mouth, and these men were the first to make known these facts to the medical profession and the people at large.

Dr. W. D. Miller, stomatologist and bacteriologist, of Berlin, Germany, when bacteriology was in its infancy, said that he believed that many micro-organisms found in the mouth, while they did not breed disease in the mouth, were capable of playing a very malignant rôle when transferred to distant parts of the body.

Dr. Geo. A. Mills, New York, says: "All uncleanly and unhealthy mouths favor disease of the soft as well as the hard tissues, and the result in a non-resisting constitution is deterioration to a greater or lesser degree. It is not at all uncommon to be able to trace directly to the unhealthy conditions of the mouth and teeth, local diseases, as of the eyes, ears, nasal cavities, or vocal organs; while in not a few cases the mucous membranes are deranged, from the lips throughout the alimentary tract."

Dr. E. C. Kirk, Philadelphia, Pa., says: "It is clear to all observers that, in spite of the close relationship between the dental and medical sciences, the general practitioner as a rule does not accord to the mouth a degree of importance proportionate to its bearing upon the maintenance of health. This overlooking of mouth disturbances by medical practitioners has been in some cases productive of fatal results."

Dr. Van Kaczorowski says: "Many micro-organisms found in the mouth are the agents in the production of fermentive processes along the line of the intestinal tract, independent of those introduced by food and drink."

Dr. Herschell, a specialist of London, in his work on "Indigestion," says that he has "found that mouth poisoning is again and again a prime factor in aggravated indigestion and heart affections."

Dr. Wm. Hunter, London, a great surgeon and eminent investigator, not long ago, at a meeting of the Royal Medical and Chirurgical Society, disputed with one of his fellows the claim that the loosening of the teeth, with a flow of pus and the wasting away of the bony structures—so-called Riggs' disease—is the chief cause of indigestion. He says:

The whole subject of mouth poisoning as a cause of disease has been one of special interest for many years, and the more it is studied, the more impressive becomes its importance, and the extraordinary neglect with which it is treated alike by physicians and surgeons. Cases identical with some of those referred to and shown have been described. A point not even referred to by any—even the most recent—writers on diseases of the stomach, is that not only is the constant swallowing of pus a most potent and prevalent cause of stomach troubles, but that the catarrh set up is not simply irritant but actually infective, and may lead in time to other more permanent effects, namely, drying up of glands and chronic stomach diseases, and in certain cases even to ulceration. This result is by no means confined to and associated with any one mouth condition, such as Riggs' disease. It can be pointed out that for every case of stomach or other affection traceable to Riggs' disease, a hundred cases equally well marked are daily to be found associated with other dental and pus conditions of the mouth. Experience shows that they include not only Riggs' disease, but some mouth and sore cases of every degree of severity—excema, pustules, ulcers, gangrene, and indeed every other form of trouble, dental and mouth, producible by pus infections.

The matter is important, not only in relation to indigestion, but in relation to the whole group of infections caused by pus organisms; local—for example, tonsillitis, glandular swellings, middle-ear suppurations, maxillary abscesses; general—for example, inflammation of the brain, kidneys, and membranes of the bones, meningitis, nephritis. Recently a patient who for several years suffered periodically from very severe nervous attacks, complicated with indigestion and curious rashes, the whole symptom-complex being regarded as of gouty manifestations, was found to be a typical case of blotchy, mouth-poison rash.

The important fact to be recognized is that one and all of these various conditions are

poisonous in their nature. The cause underlying them is mouth poisoning of the most marked character, and is of a particularly virulent character, for it is connected with decaying and diseased teeth; and a somewhat extensive pathological experience has proved that no pus organisms are so virulent as those grown in connection with dead bone. No physician or surgeon would tolerate for a moment that a patient with a foul, septic ulcer, say in his forearm, should from time to time apply his lips to the ulcer to clean it. Yet this is, pathologically, precisely what happens in the case of patients with diseased teeth and sore or diseased mouths. Moreover, the swallowing is constant, and goes on for years, unheeded both by patients and doctors.

It is probably impossible to keep pus organisms out of the mouth, just as it is impossible to prevent occasional access of the germs of tuberculosis, typhoid, and other infective organisms, but that fact does not prevent taking the most exhaustive precautions to keep typhoid contamination out of our water and from getting into our houses; or from initiating—as is at last happily the case—measures for preventing access of tuberculosis germs, and getting typhoid germs into the homes through milk.

It is urgent, in the interests of the many sufferers from stomach troubles as well as in the interests of those suffering from pus conditions generally, that some similar steps be taken with regard to the mouth—the chief channel of access, by experience, of all pus infections. It may not be possible to prevent their access into the mouth any more than we can prevent their adhering to the skin. But knowing as we do their potential qualities, there is not the slightest reason why the mouth, so easily accessible as it is to local measures, should be made into a perfect hotbed for their development and propagation.

With this wealth of opinion coming from such eminent men, it should not be a difficult matter to convince the most skeptical.

The time to start prophylaxis is in childhood. Children are taught to clean the hands and face and to comb their hair; is it not even more necessary to have them clean their teeth thoroughly before eating, or at least once a day? Much future trouble would be thereby averted, not only for the patient, but for the dentist. The most important time in anyone's life, so far as the teeth are concerned, is from six to twenty-one years of age.

The finger-nails are not nearly so important as the teeth, yet in the great majority of cases they are given much more attention. Would it be a difficult matter to guess which method anyone would pursue if he had the choice of losing the finger-nails or giving them each day a reasonable amount of care? Then why not teach our patients the desirability of preserving their teeth? It is only necessary to impress upon them the importance of the work.

The bacteriologist has found the uncared-for mouth to be the best possible place for the cultivation of bacteria, and, as nearly all the bacteria enter the body through the mouth, the importance of the care of the mouth and teeth as a factor in maintaining public health is self-evident. Disease germs lose their virulence when the mouth is kept clean, and this is true of the germ of pneumonia, which is present in at least fifteen per cent. of human mouths. If the mouth is well cared for, the danger from pneumonia is very much reduced. This cleanliness of the mouth is of great importance. Ear and eye troubles and swelling of the glands of the neck are often dependent upon dental diseases.

TECHNIQUE OF ORAL PROPHYLAXIS.

Oral prophylaxis consists of the thorough scaling of the teeth, the thorough cleaning of the mouth, the removal of accumulated decomposing food and matter between and around the teeth, polishing each tooth and all surfaces, applying antiseptics with compressed air, medicating and cleaning and purifying every space and surface in the oral cavity. Treatments, when given regularly at appointed times, will destroy all plaque-forming micro-organisms, changing a disease-producing environment to one where disease and caries cannot thrive. If this treatment is applied properly and regularly by a conscientious dentist, all infection is removed from the mouth, the teeth are beautified, the gums assume a healthy pink color, the

breath is pure and sweet—once again the general health becomes better, and that, after all, is what we ought to be aiming at. "The man with a healthy mouth is never sick; the sick man never has a healthy mouth."

In cleaning teeth, two factors are to be contended with, viz, plaques and tartar. We might add to this number the soft deposits which are so frequently found.

PLAQUES.

The effect of plaques should not be overlooked. Their influence on the process of caries is well known; their influence on the establishment of inflammation of the soft tissues is important. They ferment and act as irritants to the gum tissues. The direct result of the action of these irritants is the beginning of inflammation.

SOFT DEPOSITS.

These deposits are composed of food débris. They have a twofold effect, one mechanical, the other chemical.

The mechanical effect is that of a foreign body exerting pressure. It might be thought that deposits so soft in character would have little effect on tissues apparently so resistant as those of the gum, but experience proves that, when even soft deposits exert a continuous pressure, the gums yield.

Food deposits naturally occur most frequently between the teeth, preferably those that are malposed. They crowd on the interdental papilla, which is slowly forced down from its proper and protective place. The food is no longer diverted by the papilla, and the collections increase in amount until a pocket is formed between the teeth.

The chemical influence of soft deposits results from the fermentation of the food débris. No sooner is the food lodged than it becomes the object of attack by the micro-organisms inhabiting the mouth. Its original character is soon lost, and it becomes a medium hardly less fruitful in the feeding and producing of bacteria than the agar which the scientist produces in his laboratory. All the environment is favorable for the activity of the micro-organisms, the deposits affording food in plenty, and the mouth being moist and warm.

The active bacterial fermentation results in the production of considerable amounts of acid. Much of this acid is formed close to the soft tissues, and doubtless exerts its effect on them, before it is washed away by the influx of new saliva. While this point has not yet been fully worked out, it is reasonable to suppose that these acids act as chemical irritants upon the soft tissues.

Certain it is that the combined effects of pressure from food deposits and of the acids from their fermentation are seriously detrimental to the gum tissues.

SALIVARY DEPOSITS.

The term salivary deposits is properly limited to deposits precipitated from saliva. When the gums are in normal position, salivary deposits are confined to the crowns of the teeth. If they become sufficiently extensive to impinge on the gums, the gums retreat before them, and the deposits may then extend to or occur on the exposed root-surfaces.

For practical purposes, salivary deposits may be divided into two kinds. One of these, yellowish in color, is deposited in large quantities at or near the opening of the salivary glands. It is confined to that portion of the tooth projecting above the gums. In some mouths this variety forms very rapidly; it may be removed without much difficulty, because, owing to the rapidity of formation, it is not so dense as the more slowly forming variety.

The second variety of salivary calculus is so different in character that it might be mistaken for another form of deposit. It is much darker in color, is less in quantity, and is much more dense, owing to the fact that it is deposited much more slowly. This variety is found just underneath the free margin of the gums; sometimes it entirely encircles the tooth.

The origin of these deposits may be of interest. While nothing really con-

clusive concerning it has been worked out, the opinion prevails that the slight deposits of food and other materials that can nearly always be found underneath the free margins of the gums serve as a starting-point for the deposition of calcium salts. If a prophylactic file be inserted beneath the free margin of the gums, it can usually be withdrawn pretty well filled with a soft deposit, probably composed of broken-down food material, bacteria, tissue cells, etc. This occupies the area which, unless the teeth are given prophylactic treatment, will probably be occupied by the deposit of dark salivary calculus.

SERUMAL CALCULUS.

The deposits on the roots of the teeth differ from salivary deposits in amount, in color, and in origin. They may occur in small patches, or in thin layers which may extend over a considerable portion of the root. They are never found in masses, as is sometimes the case with salivary calculus.

The deposits on the root are likely to be brown, reddish brown, or greenish black, the color varying with the length of time the deposits have been in place and the amount of pigment absorbed.

The origin of deposits on the roots is radically different from the origin of salivary deposits, the latter being due to the deposition of calcium salts present in the saliva and food, while the former results from pathological changes in the tissues surrounding the teeth.

SCALING AND POLISHING OF THE TEETH BY THE DENTIST.

Since we know the deposits with which we have to deal, it is now possible to take up the technique of their removal.

One of the very first steps consists in the removal of loose matter from between the teeth. This can be accomplished with the aid of floss silk. Right here let me say that floss silk should be used by everyone at least once a day, preferably before retiring, before a mirror, so that it is possible to see what is being accomplished. By this method, all food particles can be kept from impinging upon the gums, thereby aiding in the prevention of recession and the formation of caries.

After this has been accomplished, a warm antiseptic solution is applied under compressed air for flushing out any pockets that might be present and ridding the spaces between the teeth of any loose particles that were not dislodged by the floss silk.

If salivary deposits are present, their removal is the next step. In some cases, owing to the engorged condition of the gums, it is impossible to remove all at the first sitting. It is a good method to remove as much deposit as possible at the first sitting, leaving the remainder for subsequent sittings. If there is any deposit underneath the free margin of the gums or on the roots, its removal will be found to require a considerably longer time than that of salivary calculus at the gingival border. Usually, at the second sitting it is possible to remove the remainder, viz, those particles that escaped instrumentation at the first sitting.

Care must be taken to remove all deposits underneath the free margin. This is very important. After all visible deposits are removed, pumice is applied around the gingival borders with a porte-polisher, as small spicules will remain which must be removed, because every remaining particle means additional advantage for the deposition of future accumulations—in other words, it forms a mesh on which new accumulations find a ready anchorage. After the surfaces have been made perfectly smooth, the porte-polisher is used on all surfaces that cannot be reached with a straight orange-wood stick. The large size is preferable, as it affords more working space and a better grip, hence, the application of greater force. There are places in which the porte-polisher of smaller size is the only one suitable to use. Shoe-pegs make splendid polishers, as the operator is able to reach points that are inaccessible to the regular porte-polisher points.

The next step consists in the use of Cutter's floss, in which the pumice is

carried to the approximal surfaces of the teeth. If one is unable to reach any points between the teeth, they are wedged apart, which procedure will pay in the end. Again compressed air is used to flush out any particles of pumice that might be present. The entire oral cavity also is sprayed, as this leaves a freshness which patients will appreciate. If it should be found upon examination that there are any particles of food about the mouth, they can be removed by means of pledgets of cotton. There are instruments especially made for that purpose.

After the patient's mouth and teeth have been thoroughly cleaned, definite arrangements are made with the patient for visits at regular stated intervals. If the patient will not do his part, he cannot expect any lasting benefits from the operator's services.

While operating, the dentist should so firmly impress upon the patient the importance of prophylaxis and its benefits that the patient will become interested in it and speak of it to others, to his own and his dentist's advantage.

HOME TREATMENT.

It is extremely necessary that patients be instructed in regard to home treatment. It is a good plan to have a typodont as a working model on which, in a very few minutes, the proper way to brush the teeth can be demonstrated. The patient must contract the habit—in fact the operator must insist on his using dental floss at least once a day, preferably before retiring. Some operators advocate—and in my opinion it is well worth practicing—the use of a staining solution consisting of—

Iodin crystals,	50 gr.
Potassium iodid,	15 gr.
Zinc iodid,	15 gr.
Glycerin,	4 dr.
Aqua destillata,	4 dr. M.

This is to be used by the patient twice a week for about six weeks, and then about once every two weeks. By these means the patient can detect the presence of the formation of bacterial plaques. This is to be followed by the use of a porte-polisher carrying pumice. It will be very awkward for the patient to use this polisher for the first few times, but as practice makes perfect, he will become adept in its use in time. This method will insure clean teeth, and, incidentally, less work for the dentist at each subsequent sitting.

PERIODICAL APPOINTMENTS.

Now the question arises, How often should a patient's teeth be cleaned? If the operator wishes to make a success of his practice, it will be necessary to see his patient at least once a month; in some cases it would not be amiss to see him twice a month. For notifying patients as to the time for prophylactic treatment one of two systems can be used. One consists in a yearly memorandum, on which the time is specified for each sitting; another method is to send cards when it is deemed necessary to see a patient. For a strictly prophylactic practice, the former method is the one to use.

THE QUESTION OF TOOTH-BRUSH STERILIZATION.

There has been much agitation recently concerning the tooth-brush, some advocating its abolishment owing to its uncleanliness, due to the fact that it is impossible to sterilize a brush except by burning. This method would entail a new brush for each cleaning. A sterilizer is being manufactured at the present time for the sterilization of tooth-brushes, formaldehyd being used as the disinfecting agent. It consists of a glass receptacle, in which the brush is securely locked. One end of this receptacle holds a small cup, in which the formaldehyd solution is placed.

MOUTH-LAMP.

I have recently been using a mouth-lamp with a mirror attached, which enables me to discover readily deposits of tartar not only on the exposed surfaces of the teeth, but also beneath the free

margin of the gums. By holding the lamp at the lingual surface of the tooth, I have been able to detect tartar lying on the buccal surface.

If the preceding technique is followed, and the patient does his part, the operator will be able to obtain wonderful and profitable results.

DENTAL EDUCATION.

By H. W. MORGAN, D.D.S., Nashville, Tenn.

(Read before the Southern Branch of the National Dental Association, at its annual meeting, at Old Point Comfort, Va., July 22, 1913.)

THIRTY years' experience in any vocation brings many changes, teaches many lessons, alters many plans. Your essayist, when preparing this report on dental education, found that it is less difficult to teach, tell about the concrete, the tangible, to organize and direct the conduct of a school, than to enter into a discussion of its great object, viz, the preparation of those who seek to obtain by its means the requisite equipment for their life-work. In the discussion of the subject, this paper will deal with it in a somewhat restricted sense.

A review of the literature bearing on dental education, of the discussions which the subject has evoked, and of school catalogs, reveals a diversity of opinions and a variety of organizations such as to convince one that, as a science, dental education is still in its youth—vigorous, earnest, and healthy, to be sure, yet no one is prepared to assert that even a rational curriculum has been fully agreed upon.

THE EVOLUTION OF DENTAL EDUCATION.

The history of dental education is necessarily a history of experimentation. It cannot be claimed that the ideal plan for a scientific education has as yet been attained.

An analysis of what is offered in college catalogs amply supports this contention, and, while much information is gained from this source, one cannot but be impressed with the diversity of plans presented. These catalogs furnish much food for thought, and from them the practitioners of our profession should derive a knowledge of this subject, instead of relying upon a personal acquaintance of what certain colleges were in the past.

The schools of twenty years ago deserve more than the memory of their shortcomings and the fact that few, if any, were accomplishing what is being done today. They were the pioneers, as were the great men whose names are associated with them, and were necessary in the evolution which has been going on so rapidly and effectively.

UNJUST CRITICISM.

What have been termed "loose criticism" and "unjust attacks" upon colleges have been a stimulus which has stirred hearts and minds to bringing about better conditions, and out of these unfavorable comments has come much material progress, though they wounded at the time.

No age has poured out such a wealth of energy upon education as our own. In no period of our history have those in charge of the work tried so hard, paid so lavishly, or sacrificed so much to afford every opportunity for a broad, intellectual foundation for a professional training; yet never has there been such

critical discontent with dental education —this in the face of the fact that graduates of dentistry of today are better prepared to begin their work than are those of other professions.

These criticisms do not always come from the informed, are not the result of a careful investigation and study of the efforts put forth, but too frequently come from men with impractical theories that have been tried and have proved failures, or are based upon a few cases which were at variance with the views of these critics.

THE STUDENT'S MOTIVES IN SELECTING A DENTAL SCHOOL.

The young man who gives any thought to the selection of his school, in looking over the field finds various types from which to choose, and his choice is often made from motives which have little to do with his intellectual equipment or efficiency as a professional man. Sentiment is too often a dominant factor. He seems to be obsessed with the idea that, if he can gather sufficient knowledge to "get by" the faculty, obtain his degree and pass a state board of examiners, his equipment for the battle of life is complete.

DEFECTS IN THE AIMS AND CURRICULA OF SCHOOLS.

Our whole system of education seems to have drifted into one of "graduation" instead of "education"—a cramming process in which the demand is, how many things can be crowded into the three years, while in reality it is only possible to lay a foundation for future development. The student too often takes the short cut, only to find himself early clamoring for postgraduate work, having failed to avail himself of his opportunities. This is no fault of the college, but in our opinion the overcrowding of the system has much to do with it.

Fewer subjects, eliminating those of purely cultural value, more thorough grounding in the philosophy of the work, and thoroughness in all elementary consideration of each, will lead to a more earnest studenthood, and arouse ambition in a larger percentage, than is being accomplished by present-day methods.

THE TYPES OF DENTAL SCHOOLS.

A survey of the dental catalogs of our country reveals the existence of the following types of schools:

(1) There are institutions founded upon the idea that dental training should be had from dentists, in other words that instruction in all the subjects taught should be given by practitioners of dentistry.

(2) The institutions in which dental subjects are in charge of dentists, and the fundamental work is done by medical graduates.

(3) University dental schools, in which the dental subjects are being taught by practitioners of dentistry, or those who have been practitioners, and instruction in the fundamentals is being given in conjunction with medical classes.

(4) University departments, where the strictly dental subjects are covered by dentists, and the training in the fundamental subjects is given by medical graduates in separate and specialized courses *adjusted to fit the needs of the dental student.*

A study of these brief summaries and a careful weighing of the causes that have led to their development will sustain the statement made above, that those interested in dental education have been experimenting, and have tried first one plan and then another.

A BROADER VIEWPOINT ADVOCATED.

The progress achieved, which is based upon the sciences on which all knowledge of the healing art rests, has been great. As knowledge increases, more and more time is required to cover the subjects taught, and the work must and will become more and more specialized. To expect the best results and broadest culture, the scientific side of the fundamentals must be emphasized not only

as so much science, but as so much essential knowledge with a broad medical application to dentistry.

It would be too much to expect this from any and all schools. The school of the future must become an *infant bureau of research,* if this term may be used, but all this work must have a restricted or specialized dental point of view. The foundation should be thorough, comprehensive, and broad, but the application should be *dental.*

If these conclusions are correct we must look for the separate training of dental students to become universal. The reasons are apparent and must not be overlooked nor idly brushed aside.

In the endeavor to train dental students with the medical student, many essentials which the dentist should know in chemistry, metallurgy, histology, pathology, anatomy, surgery, etc., must be omitted, or else the time of the medical student is consumed in the consideration of much that is not essential to his education. In anatomy alone, two months of additional study would be required. It is for these reasons that many schools which were formerly conducted like those in class 3 have come to accept the methods of class 4.

We are living in an "age of transition"—not, as is often implied, of "instability of things," but one in which clear heads are preparing the way for greater things. We invite criticism, but it must be just, and the critic must be competent to speak from intimate knowledge and experience. He must not be a convert of yesterday, nor the exponent of an untried scheme, nor yet the advocate of a long-exploded idea.

The dental profession of America owes it to the future student, to itself, and to humanity, to be informed, and to so direct the dentist of the future that he may make no mistake in his effort to become a respected member of our great profession and a qualified servant of humanity.

PROCEEDINGS OF SOCIETIES.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Annual Meeting at The Hague, August 27, 28, and 29, 1913.

[Report furnished by courtesy of the *British Dental Journal.*]

(Continued from page 377.)

COMMITTEE ON DEONTOLOGY.

On Friday morning, August 29th, the Committee on Deontology met, consisting of Drs. Rosenthal, Aguilar, and Roy, who were appointed at Stockholm a committee to draft

An International Code of Ethics.

Dr. E. Rosenthal, chairman of the committee, submitted the following report:

In the evolution of a profession, the ethical side, dealing with the relations of the practitioner with society in general, with individuals in particular, and with his colleagues, is too often relegated to the background, all the attention of teachers being devoted to the progress of dental science and to everything concerned with its application.

The F. D. I. believes that it is important to counteract this tendency, which neglects a question that has considerable importance for the complete development of our body politic, whose progress has been so rapid in recent decades, thanks to numerous discoveries made in a relatively short space of time.

The committee which you appointed to draft a code of ethical principles, after having examined them in their essential elements, has also directed its attention to the best way of enforcing them, and to the most practical method of making such a code known in all dental societies of the world.

Finding that it is difficult to reform established customs and almost impossible to change the mentality of a grown-up man, we believe that the best opportunity occurs in adolescence, at the university and the dental school, for molding the mind of the future practitioner in such a way that he will in the future act only according to a rule of conduct based on ethical principles.

We are convinced that the greatest benefit must result from a course of instruction animated by the best spirit of altruism, demonstrating to the student how much it is to his direct interest and the interest of society that he should begin the practice of his profession with the highest ideals of the mission he has to fulfil, and also convincing him that, if the diploma that he is about to obtain confers upon him certain privileges and rights, it, on the other hand, imposes upon him certain duties and moral obligations. The student should realize that he is entering an immense family, united by common bonds of solidarity, and that it is to his advantage to cherish the ambition to participate, by his conduct, his attitude, and his deeds, in the elevation of the great body to which he will belong.

It is indispensable that, during his professional studies, the student should

become thoroughly impressed with the idea that he is going to join a body of men who possess principles of honor which one cannot transgress without injuring his colleagues, and that it is his own duty to make every effort to assist in the constant elevation of the profession.

In virtue, too, of the privilege granted to him and the protection surrounding him, the practitioner owes part of his activity to the community, and is bound to place at the service of humanity his knowledge and science. This is all the more true where society makes sacrifices to permit certain of its members to study and acquire the ability necessary for practicing a profession. It would be unjust and illogical that these sacrifices, made by the community, should solely benefit the individual fortunate enough to profit by them.

A good social organization demands that in return for the enormous expense necessitated by the building and maintenance of teaching institutions, with their museums and laboratories, and also in return for the advantage accorded to holders of diplomas authorizing them to practice their profession to the exclusion of all others, every practitioner should consider that he owes part of his efforts to his fellow men. This duty can be performed in an infinite variety of ways, and each must be left to judge how best he can render such service. Some by their researches in laboratories will increase the sum of scientific knowledge, and their discoveries will assist in alleviating human suffering and making human life happier and longer. Others will give direct personal service to the unfortunate, and part of their time to caring for the poor. Again, others will devote themselves more especially to teaching, and will hand on to new generations what they have themselves received, forming thus the link between the past and the future, and insuring the continuance of a common aim. Each in his own sphere and according to his talents and aptitude will have a task to perform that is absolutely altruistic and independent of that which he performs every day to earn a subsistence for himself or those dependent on him.

All those who practice a liberal profession occupy a high position in society; it is by reason of the services they render and the public spirit which they manifest, that they will enjoy the regard and esteem of all. In order to reach and to maintain themselves at this level, practitioners must have respect for each other, and the rules regulating their relations should be characterized by the principle of mutual consideration. Every word, every gesture, every act having for intention or result the depreciation of a colleague in the judgment of others is as harmful to the doer as to him who is the object of such conduct, and reacts upon the whole profession. Without wishing to cover up a clumsy blunder, negligence or ignorance, each must safeguard the reputation of his colleague and act so as not to aggrieve any interest. It is imprudent to express an opinion without having heard both sides and without having weighed the arguments of the opposed parties. Circumstances may have existed which amply justified such or such proceeding which, at first sight, seems open to criticism. At all events, one must never forget the principle, to do unto others as you would that they should do unto you. Every practitioner owes it to his profession to do nothing which may injure its prestige. He must abstain from all vulgar methods of attracting the attention of the public either to his manner of operating or to the moderation of his fees. Only his personal worth, his integrity, and his ability can bring him public attention. He disparages himself and harms his own good reputation and that of his profession in resorting to methods of publicity that are quite admissible in certain spheres of human activity, but are quite incompatible with the practice of a liberal profession possessing a high ideal and having only incidentally a commercial aspect.

These are the basic principles which have been employed in elaborating the code which we have the honor to submit to your deliberation, believing that they

are common to humanity and consequently of universal application. We propose to circulate them throughout the world, and particularly in the teaching institutions where they will have the greater effect in initiating our young men into the principles therein contained. We cannot hope to change the world in a day, but it is in preparing the way for future generations that we shall attain the purpose we all have in view—to raise to the highest point our profession, which we desire to see as much appreciated by all as by ourselves who love it.

Dr. Aguilar. As the author of the proposition, I am in full accord with the principles laid down in the interesting address given by our chairman, Dr. Rosenthal. Unfortunately, I am not prepared to present a scheme for a code of ethics. It is a most difficult task, because we must codify all the duties of the practitioner toward the public and the profession, and at the same time we must not interfere with the customs and habits of each country, since what it considered unethical in one country is not so regarded in another. Men do things wrongly, as a rule, because they are not taught to avoid what is wrong. In Spain, charlatanism was once rampant, but since the introduction of our code of ethics we are practically abolishing all open advertisement, and the dentist who advertised with letters a meter long has now disappeared. These things are not done today, because we have taught men that they are wrong. Since we have done it in Spain, I think the moralization of our profession could be accomplished by the recommendation of a code of ethics. We are not prepared for it yet, because we have not a common basis, but we can take one definite step and urge that in all dental institutions and schools one lesson on dental ethics should be included in the curriculum. Meanwhile we can prepare a code of principles which we may recommend. In some countries such instruction exists in the curriculum, but in many places the student leaves school without knowing what are his duties to the profession and to his colleagues. I propose that a small committee of three members should present at the next meeting a report on a project for a code of ethics, simple and concise, consisting of eight or ten articles. I am sure that, when this is approved, it will be adopted by hundreds of dental societies which are today at a loss on the subject. Our own code might serve as a guide, with modifications that may be necessary.

M. Quintin agreed with Dr. Aguilar. At Brussels they had proceeded on the lines suggested, and each student had to sign an undertaking to conduct himself honorably, while a spirit of solidarity and altruism was inculcated at the dental school. They should take a positive and not merely a negative line in giving such training.

Dr. Scheele said that such a proposition was agreeable to Germany. With good-will and industry, a code could be established everywhere. They had already a commission to deal with ethics, and this was supported in every way by the profession.

Mr. Lenhardtson doubted if one lesson would be sufficient. He thought students should be instructed not only as to their attitude and behavior to the public, but also to the medical profession and to public authorities. He would take a little broader view of the question.

Dr. Godon. I approve of the excellent report of Dr. Rosenthal, and congratulate Dr. Aguilar on his proposition. We have obtained extremely important results from such teaching in France. In the École Dentaire de Paris the conditions of admission to the diploma oblige the student to make a written promise "to conduct himself according to the rules of professional honor, and especially to abstain from all advertisement." The *Conseil de famille* also examines the student's character and calls him to order, if required. I propose that this rule be recommended for adoption in all schools.

Dr. Brophy. The remark made by Dr. Aguilar as to ethics being taught in schools has brought to my mind certain questions which I think this com-

mittee could take up with advantage to the profession generally. What we aim at is a higher standard of professionalism. We want to raise the profession to a place which will cause every other profession to respect it in every way. We need to educate our students better than we have done in the past in ethics. In my country this has not always received the attention in the fifty dental schools of the United States which its importance demands. We want to make our young men professional men with professional ideals. I would eliminate the question of curriculum. If we are sincere in carrying out the ideal of ethics we must begin at home. I cannot conceive how a young man educated at a proper institution could put up a sign that can be read three or four blocks away without knowing it is unprofessional. The old maxim that a stream cannot rise higher than its source is applicable here. The young man should be taught to do his duty to his patient, and to do nothing which he would not have done to any member of his family. When the F. D. I. raises its voice against the lack of education in ethics in our schools and dental institutions, then we shall have accomplished a great work in this line. I am not criticizing any one institution or country. I take it home just as much as elsewhere. Knowing we must institute a reform in our course of training, we must begin at the very foundation, and lead young men up step by step to attaining such ideals as will win greater respect among scientific men in other professions.

M. Quintin asked when the Paris student signs the undertaking mentioned.

Dr. Godon. He signs on entering the school.

M. Quintin thought it better that lectures on ethics should be given by a dentist than by a lawyer or layman.

Dr. Subirana said there were no charlatans in Spain since the Odontological Society had instituted a code of ethics.

Dr. Aguilar. We have in Spain a body of sanitary inspectors who are physicians appointed by the government, and whose duty it is to supervise the conduct of doctors. These have also the moral obligation to take note of the conduct of dentists. We have also a dentist in each province who is appointed by the government authorities in Madrid to report any cases of unqualified practice.

Dr. Schaeffer-Stuckert. I think this discussion is of great interest and importance. In Germany we have succeeded in obtaining a board or council of dentists established by an imperial order. This council has power to make regulations on ethics and to decide such matters for dentists. There are two members for each province in Prussia, and thirty-five members in all, elected by ballot. Practitioners who are not of good standing are excluded from being elected and from voting. In the autumn or by the beginning of next year, we shall have these councils, which are the same for doctors and lawyers, in operation all over Germany.

Dr. Brophy. We have one state in the Union where the medical board has power to revoke the license of any man proved after trial to be unethical. The result there is that all big signs have disappeared and all unethical men are behaving themselves.

Dr. Jenkins explained that the dominant note in the American system of education was the moral guidance of young men, and this had been the case from the days of the early settlers. The American student was, therefore, surrounded by certain moral safeguards which, he believed, scarcely obtained in other countries. Dr. Jenkins related an instance of moral discipline at the University of Pennsylvania. He believed that dental schools in America would welcome and indorse any suggestions for raising the standard of ethics from the very beginning of the training of dentists.

Dr. Aguilar. I am very pleased to hear the favorable opinions expressed. M. Quintin's proposal to institute a course of lectures on dental ethics could not be adopted in our country, where the state pays the teachers. I want to

establish a principle and let it be applied in each country according to circumstances. Dr. Godon makes a proposition which some of us could not accept. Such a rule could not be enforced in a state institution, where the student must be subject to the same rules as any other profession. We can recommend instruction on the subject, but we cannot demand it. Dr. Schaeffer-Stuckert has made a very interesting announcement about a tribunal of honor, and this has proved the advantage of these international gatherings. In Spain the physicians have such a tribunal, but the dentists have not.

It was resolved (1) That Drs. Aguilar, Rosenthal, and Schaeffer-Stuckert be appointed a committee to draw up a code of ethics, which shall be discussed at the next meeting; and (2) That the F. D. I. recommends all institutions for dental teaching to include instruction in the principles of dental ethics.

Dr. Godon withdrew his proposition, but asked that it be referred to the committee, and this was agreed to.

COMMISSION OF EDUCATION.

This commission met on August 29th. In the absence of the president (Dr. E. C. Kirk), Dr. Brophy, hon. president, was elected to the chair.

Dr. Aguilar read the report of Dr. Kirk, published in the Stockholm (1912) *Transactions*, pp. 47-52.

Dr. Brophy called attention to the point emphasized by Dr. Kirk, the importance of teaching men how to be teachers. He would invite Dr. Godon, one of the pioneers of dental education, and Dr. M. L. Rhein (New York), a distinguished member of the profession in the United States and vice-president of the National Dental Association, to speak.

Dr. Godon said that at Stockholm they had an interim report from Dr. Kirk. They were awaiting a definite reply on the two questions referred to the committee as to the methods of instruction which shall combine artistic with mechanical skill, and as to the proportionate degree of practical teaching to be associated with didactic instruction. In the absence of Dr. Kirk, he thought they should consider the question *de novo* and collect opinions from men qualified to express them. It was necessary to settle this question as soon as possible, and he suggested that a detailed report should be presented on the three resolutions adopted in London in 1911:

(1) That the Education Commission of the F. D. I. views with satisfaction the gradual disappearance of the preceptorial system, *i.e.* private pupilage, as a recognized method of preparation for dental practice, and would welcome its complete elimination and the general adoption of the technic method, *i.e.* dental school mechanical training.

(2) That the Education Commission of the F. D. I. is of opinion that the technic method, *i.e.* dental school mechanical training, can be utilized so as to develop the artistic sense as well as manipulative skill, and that it is the duty of dental school authorities to endeavor to arrange and elaborate their method of instruction in such a manner as to secure this end.

(3) That a subcommittee on pedagogic methods be appointed to undertake detailed consideration of teaching methods in vogue in the several countries, and also to consider the proportionate degree of didactic teaching which should be associated with the technic method of training, and to report thereon at a subsequent meeting.

Dr. G. Cunningham. We have to reconcile, in the new idea of teaching, the depreciation of mechanical dentistry in favor of operative work. I have no hesitation in saying that manual training is necessary for the operator as well as for the mechanic. The curriculum in almost all our schools requires rectification in this respect. I support Dr. Godon's view.

Dr. Guy. In regard to the resolution proposed by Dr. Godon, I think the commission should have certain information as to what was proposed to be done and what has actually been done. These resolutions were the result of a considerable amount of discussion in this com-

mission and at the F. D. I. meeting. I think there will be general accord with the principles expressed in these three resolutions. The work of this commission was to collate and digest all valuable data and information from as many schools as were willing to supply the data required, in order to prepare a definite report. As a result of the deliberations of the small committee appointed in 1911, Dr. Kirk has sent out a series of questions, which were quite specific and demanded accurate and detailed answers. I furnished Dr. Kirk with detailed answers to all his questions, and I know that our president (Mr. Paterson) did the same. I presume that other authorities have supplied Dr. Kirk with that information. Now this information alone can furnish the basis of such a report as we can consider with advantage. We read with pleasure this interim report from Dr. Kirk, because we feel that he has expressed in charming literary form the sentiments by which we are all animated. But this is no longer a question of sentiment, as we are unanimous in regard to it. What we seek now is specific and detailed information, and until we have this it is impossible to give any advice or to make any recommendations which would carry any weight with the educational authorities of the world. I think we should refer this matter back to Dr. Kirk or to the committee with definite instructions that a report containing all this information, duly digested, be presented, with advice based upon consideration of it, at the next session. I support Dr. Godon's resolution.

Dr. Aguilar. I do not think the resolution would carry us to any practical point. Dr. Kirk only asks for an extension of time in which to complete the report. I would suggest that the Organization Committee of the next congress be requested to include, as one of the subjects for report in Section X (Dental Education), "Methods of Manual Training."

Dr. Guy. I think this is a very desirable subject for a paper in that section, but we consider it best to reserve reports for matters of definite knowledge.

Dr. Godon regretted that the subject was not included in Section X.

Mr. Brooks. If desired by this meeting I will, as a general secretary of the congress, bring the subject before Section X, but, as Dr. Guy has said, we should prefer its being presented in the form of a paper rather than as a settled report.

Dr. Guy. The point is that the work of the congress is not limited to the reports. We expect that the papers and communications will in all probability exceed in interest and evoke more debate and discussion than the reports. We do not wish to put every possible subject for debate in the reports, but rather subjects on which there is less divergence of opinion. We desire to have the expression of everybody's opinion on every branch of dental knowledge in the papers.

Dr. M. L. Rhein, New York. I have pleasure in informing you that the National Dental Association of the U. S. A. has been reorganized, with a membership of 15,000 dentists. We are numerically in a very strong position, and we feel that the subject of greatest importance for the profession is this one of education. We realize the difficulties Dr. Kirk must feel in bringing up a report on such a subject. At the same time the most important thing we have to consider is the danger of remaining in the position of today. It behooves us to remember this is a world of progress, in which the conditions of today become obsolete tomorrow, and we must steadily advance. Speaking only for my own country, I have always been impressed with the difficulty of combining the practical with the didactic in the mind of the teacher. Even if the teacher is remarkably well versed in the science of his subject, he so often unfortunately lacks the dental mind, which can only be born in us, and too frequently I see misapplication of the scientific side in its dental application. This works also in the opposite direction, and an able teacher, who lacks an adequate appreciation of scientific knowledge as pertaining to pathological and physiological facts, too often handles the mouth

without giving due consideration to these two conditions. Looking ahead fifty years, we can see the culmination of such possibilities when the teacher of scientific subjects shall have this dental intuition of the scientific truths we know so well. From my own personal observation I have seen the greatest mischief wrought by magnificent dental technique misapplied. It is for the F. D. I. to consider seriously how rapid is to be the progress of the movement for bringing to the front the teacher who shall combine the practical and the scientific side of dental training. This is the question uppermost in my own mind at present.

Dr. Godon's proposition was adopted.

The meeting concluded with a cordial vote of thanks to Dr. Brophy for presiding, proposed by Dr. Godon.

COMMISSION OF BIBLIOGRAPHY AND DOCUMENTATION.

On August 29th, M. Huet (president of the commission) in the chair, the following report was received and considered:

Report of the Secretary.

Gentlemen,—According to the program which was outlined at the Stockholm meeting, the commission has endeavored to secure as complete a service as possible of professional journals and periodicals, and to obtain the greatest number of volumes and works for the library of the F. D. I. If we compare the situation now with that of last year, we must recognize that our progress is not great, at least in respect of the number of journals received. We have only added the supply of the following eight journals: *Annales* of the Brussels Surgical Institute, *Ash's Monthly, La Odontologia Dominica, La Vie Internationale, Revista Dentaria Brasileira, El Odontologo Venezolano, Revista Odontologica* (Colombia), and *Finska Tandläkare Sällskapet Forhandlingar.* There is yet much to be done in this direction, and each member or editor should see that his professional journal is posted free to the F. D. I. library. The position of the library is, happily, improved, and the number of volumes received this year amounted to fifty-six, for which we thank the authors and donors. We mention specially the "Bibliography of Spanish Odontology," which contains a catalog of all dental works printed in Spanish. This is the work of Dr. José Martinez Sanchez. It is to be desired that each country should undertake this. South America has rendered signal service this year in effective collaboration, sending most of the works received. We note also that our *confrère* Dr. Guerini of Naples has forwarded a collection of his books. May this example be followed.

We append to our report a complete list of volumes now in the library of the F. D. I. In accordance with the instructions given last year by the Executive Council, we have begun the task of drawing up as complete a list as possible of practitioners, dental societies, and professional journals in the world. We have asked for representatives in different countries to assist in this, but co-operation has not been frequent. We have obtained a complete report from Messrs. Ramberg (Stockholm), Christensen (Copenhagen), Aguilar (Madrid), Riethmüller (Philadelphia), and Schaeffer-Stuckert (Frankfort). The publishing house of Meusser (Berlin), have kindly sent, on request, two copies of their directory of dentists, dental depots, and manufacturers of the world. With the documents received and those we still hope to receive, we hope to complete this book and bring it up to date. We make a fresh appeal for this purpose, and we will try to obtain information either from national committees or dental societies. We ask members to give us the names of *confrères* who are in a position to assist us. With the new organization we hope to establish, we anticipate finishing this work this year, in the expectation of having next year as complete a service as possible in bibliography and documentation.

In conclusion, we desire to communicate the chief resolutions passed at the second World Congress of International Associations, held this year at Brussels,

and at which I represented the F. D. I. Most of them appear to me to be important for the F. D. I. With regard to documentation, we notice the following: "Each international association should undertake to establish under its control a classified international bibliography of its subject, incorporating the elements of national and state bibliographies, and adding to it abstracts of periodicals." This has already been adopted in principle by our Federation, and it is our duty to carry it into effect. A report on model regulations for international congresses, presented by Dr. Gariel, contains excellent ideas which would be very useful to us and are worth adopting, with perhaps some small modifications. We hope thus, as M. Huet stated at the opening session, to have general co-operation this year in order that dental science and art may possess, like other sciences, a service of bibliography and documentation such as will meet the demands of human knowledge.

A. JOACHIM, *Secretary.*

Program for the Commission for 1913-14.

(1) Abstract or report of all original articles appearing in publications supplied to the F. D. I. library.

(2) Drafting a complete list of dentists, dental journals, and dental societies in the world.

(3) Report on dental legislation in all countries.

(4) Report as to dentists attached to army and navy dental service in each country.

(5) Regulations for the Commission of Bibliography and Documentation.

Dr. AGUILAR proposed the adoption of the report, which, he said, represented a large amount of work. He suggested that the commission should have a vote of 500 francs.

Dr. ROSENTHAL agreed, and remarked that, though he was bound to exercise economy, he was in favor of productive expenditure that would assist and extend the work of the commission.

Dr. GODON said he was very grateful for the work of the commission. It was most useful and interesting, yet difficult work, especially in indexing all odontological literature. They must endeavor to make the work and objects of the commission known all over the world.

The report and program were adopted.

M. HUET submitted two resolutions adopted at the Congress of International Associations. One urged the need of an international convention among all states for regulating the status and functions of international associations, and the other recommended legal protection for their titles and emblems.

These were approved.

Dr. AGUILAR advocated the establishment of a permanent office like that of the International Medical Congress at The Hague, which is subsidized by the state.

Dr. ROSENTHAL said this was an important question for future consideration. At present, the home of the F. D. I. was virtually at Brussels, because the archives were there.

Dr. GODON hoped that the Executive Council would discuss this suggestion.

On the proposition of Dr. Godon, it was agreed to include Statistics in the scope of the commission, and to approve the alteration of its title to "Commission of Bibliography, Documentation, and Statistics."

THE ANNUAL BANQUET.

THE annual banquet of the F. D. I. was held on August 29th at the Palace Hotel, Scheveningen, and it was a very successful function.

Mr. PATERSON presided, and read a telegram from the Queen Mother of Holland, as follows: "Her Majesty the Queen Mother expresses her most gracious thanks to the members of the International Dental Federation for the telegram of homage." He also read another from the King of Denmark, viz, "I thank the International Dental Federation for kind message, for which I return my best wishes for your session. —CHRISTIAN, *Rex.*"

In the course of the banquet, the PRESIDENT gave the toast of the Queen of Holland, wishing her long life to reign over a happy and contented people.

The toast was honored with enthusiasm and the Dutch National Anthem was sung.

Professor JESSEN, in proposing the toast of the health of the Queen Mother of Holland, said: In Denmark and Sweden, thanks to the efforts of Professor Christensen and Mr. Lenhardtson, the patronage of the reigning sovereigns was obtained, and in this way the Hygiene Commission had gained valuable support in its campaign against dental caries. Thanks to the efforts of Dr. Van der Hoeven, the Queen Mother of Holland had accorded her patronage to the movement, and they hoped that her Majesty's gracious influence and interest would further the creation of school clinics in that country. He gave the toast of "Emma, Queen Mother of Holland."

In Memory of Miller.

The PRESIDENT said that on the last visit of the F. D. I. to Holland they met under the shadow of a great loss, their esteemed and revered leader, W. D. Miller, having been taken away suddenly. But for the energy and courtesy of Dr. Sauvez, and the generous support and kindness of their Dutch colleagues, led by Dr. Grevers, the F. D. I. meeting might have ended in a fiasco. He thought it fitting at such a moment, when they were revisiting Holland, that the memory of their departed leader should be solemnized. (The company then rose in silent tribute to the memory of Dr. Miller.)

Presenting the Miller Prize.

Proceeding, Mr. Paterson said he had the great pleasure of presenting the Miller prize to their hon. president, Dr. Charles Godon. In the first place he had to apologize for the fact that only a portion of the prize could then be presented. Circumstances beyond his control had prevented the complete presentation on the present occasion. The gold medal was, he regretted to say, not yet struck. Both it and the award check for interest from the prize fund would, however, be presented at the congress meeting in London next year. He hoped that the presentation on that occasion would lose nothing in the matter of form and ceremony by the delay. He felt it to be his duty, notwithstanding the protest of Dr. Godon, to inform the company that the money portion of the award would be but a presentation in form, for Dr. Godon had most generously decided to hand the money to the trustees of the Miller Fund to further augment its capital. When one contemplated the many objects, charitable and otherwise, existing in France, dear to the heart of Dr. Godon, to which that money might be applied, the word generosity connoted with accuracy their feelings in the matter. In presenting the diploma of honor to Dr. Godon, he desired that its terms should be announced by the secretaries in French, German, and English, and he called upon Dr. Aguilar, secretary to the Fund, Dr. Schaeffer-Stuckert, and Dr. Guy, respectively.

The PRESIDENT then presented the diploma, which was in illuminated album form, to Dr. Godon, with his heartiest felicitations. The "Marseillaise" was sung, followed by hearty cheers for Dr. Godon. Many of the older members, rising from their places, followed the example of M. Francis Jean and saluted the prize-winner.

Dr. GODON, in reply, said: In trying to thank you for your touching testimony of appreciation, I do so with great emotion—for, as has been said, great joys, like great sorrows, are dumb. You will understand that my feelings are so deeply stirred at this moment that I must limit myself to acknowledging the cordial speech of our president. Pardon me if I do not find words suitable to express my sentiments of gratitude. The magnificent diploma which you, Mr. President, have just handed to me as the recipient of the Miller prize, is a most artistic production, which does great honor to the refined taste of those who inspired it and to the talent of the artist who executed it. I see in it the most valued testimony of the esteem and regard of the *élite* of my *confrères*, and the highest recompense that could be bestowed upon me

for my modest efforts. I am all the more sensible of this distinction because it was awarded to me in my absence last year at Stockholm by the most eminent international jury of dental art at a time when a sad bereavement kept me for the first time in thirteen years away from the annual meeting of the F. D. I. When I contemplate this beautiful diploma, I see passing before my mind all the glorious history of our Federation for thirteen years. It first recalls to me all the dear French *confrères* who have worked for thirty years with me in the renovation of our art in France, and united to bring into being that important and successful International Dental Congress in Paris in 1900, from which the F. D. I. was born. Next I recall the devoted co-workers in all countries, men of generous heart and lofty mind, who responded with enthusiasm to the appeal addressed to them in order to form our Executive Council and our commissions. They did not hesitate to leave each year their homes, their families, and their professional duties, and to travel the greatest distances, in order to meet in the different capitals of the world where the F. D. I. has successively held its meetings, and to work together in this great consultative council of the dental art with the greatest disinterestedness for the progress of our special science, for the good of our profession and the relief of humanity. For a moment I pause to salute sorrowfully the memory of those early workers who have passed away: Lecaudey of Paris, Harlan of Chicago, Franck of Vienna, Hesse of Leipsic, Barrett of Buffalo, Haderup of Copenhagen, and our great Miller, whose memory we preserve with veneration and gratitude. And I review each of our interesting annual meetings. After that of Paris came London and Cambridge, Stockholm, Madrid, St. Louis, and Berlin (cities of our brilliant fourth and fifth international congresses), Hanover, Geneva, and London, whither we returned in 1911, and where preparations are now being made, under the able direction of our president, for the Sixth Congress. Our kind Dutch *confrères*, like those of France, England, and Sweden, have twice shown us their courtesy and hospitality, at Amsterdam in 1907, and this year in their beautiful capital, the Hague. In this way, during thirteen years, a valiant phalanx has borne the banner of the F. D. I. around the world, winning in turn the confidence of the profession and the esteem of public authorities, and compelling their attention to the principles which it represents and the reforms which it advocates. And today, what a wonderful framework you have chosen for the splendid tribute of which I have the honor to be the object! I do not mean only the charming picture made by this handsome banqueting hall at Scheveningen, graced by the presence of ladies and a gathering of the *élite* of the dental world, but I refer particularly to the conditions under which we meet in this hospitable country of generous thinkers and bold pioneers on the day after the inauguration of the Carnegie foundation, the Palace of Peace. Do you not think that our F. D. I. appears here, in its limited domain of evolution, as a symbol and an early realization of that universal fraternity which is by many regarded only as an admirable chimera? In addressing myself to the worthy representative of the Federation, Mr. Paterson, to whose vigorous and able hands have been entrusted for four years past the control and the future of the F. D. I., I say to him, in conclusion, with my heart full of profound gratitude for the high distinction—the crowning of my professional life—just conferred upon me, Thanks, and again thanks!

Dr. Van der Linde, president of the Society of the Dentists of Holland, said he wished to thank Mr. Paterson for his kind references to the Dutch dental profession, and for his appreciation of the Dutchman's knowledge of foreign languages. It was of great importance to them to study the dental journals in English, French, and German; they had heard with great pleasure the speeches of the delegates of various countries; and they felt honored by their acceptance of the invitation to Holland. They

had all followed the deliberations of the F. D. I. with the greatest interest, and he hoped the meeting would cement the good relations between Dutch dentists and the F. D. I., and lead to closer co-operation. He proposed the toast—"Success to the F. D. I."

Dr. T. W. Brophy, in response, said Dr. Van der Linde's expression of the feelings of Dutch dentists toward the F. D. I. had touched them deeply. From his earliest boyhood he had esteemed highly those whom he had met in his own country from Holland. He was present at the birth of the F. D. I., and had attended every meeting with two exceptions since its formation. They were now concluding its thirteenth meeting, and many had fallen by the wayside since they first met in Paris in 1900. The remarkable career and the great work of their leader, Miller, was referred to by the president, and they might speak of others who fought for the F. D. I. in its early struggles. For a time it was regarded with a good deal of uncertainty by many, but when some withdrew, some hesitated, and others were pessimistic, there were stanch men whose resolution and determination and confidence in its possibilities led them to support it with a loyalty that never faltered. Chief among these was the resolute, unswerving Frenchman on whom they had just bestowed the highest honor they could confer—Dr. Godon. When the history of the F. D. I. came to be written—perhaps twenty-five years hence—the services of Dr. Godon would have a prominent place. Some might remember the closing address given by Sir Michael Foster at Cambridge, and the speeches of Sir James Crichton Browne and Professor Woodhead on that occasion, but Mr. G. Cunningham was responsible for the initiation at that meeting of one of the most important movements in the F. D. I.—the care of children's teeth.

What of the future? The F. D. I. had brought together the nations of the earth in educational and professional work, but that should not suffice. They must go forward and increase their efforts to bring about a higher standard of professional education and practice, so that the future historian might recognize the F. D. I. as the prime mover in bringing all the colleges and institutions of dental training up to a high standard. More than all this, there was another phase of the subject that was bringing men together. The late Dr. Harper, president of Chicago University, once said there was no more effective way of leading people to a better understanding of a great subject and of attaining the results desired than to bring them together at the table, where they could sit down together and know one another. The real reason why some men did not like other men was because they did not understand each other's real views. One of the great aims of the F. D. I. was to bring about this better understanding, and he was glad to say that perfect harmony prevailed in it. He did not know of a nation which looked upon its work with anything but sympathy and appreciation, and while that was so they could safely wish "Long life and success to the F. D. I."

The toast of "The Ladies," ably and humorously responded to by Dr. Frenckel, concluded the banquet, and the company adjourned to the terrace overlooking the sea and enjoyed coffee and conversation in the moonlight.

EXECUTIVE COUNCIL.

FINAL SESSION.

The Executive Council met on Friday afternoon, August 29th, to consider the reports of the Commissions of Hygiene, Education, Bibliography, and Deontology, and to transact the concluding business of the Federation; Mr. Paterson (president) in the chair.

Report of Hygiene Commission.

Dr. Jessen and Mr. Lenhardtson submitted the recommendations of the Hygiene Committee, including names of persons to be elected honorary members.

Dr. Rosenthal pointed out that

members of the Hygiene Commission who are dentists must also be members of the F. D. I.

Dr. Jessen agreed.

Dr. Rosenthal said he would notify them of the fees for membership.

Mr. G. O. Whittaker was added to the Hygiene Commission.

Mr. Lenhardtson proposed the adoption of the following resolution from the Belgian National Dental Federation:

"That the F. D. I. recommends the governments of the different states to include dental treatment by qualified dentists in all laws concerning public medical assistance."

This was adopted unanimously.

The Hon. Treasurer (Dr. Rosenthal) reported that he had audited the accounts of the International Hygiene Commission and found them correct. It was agreed that the accounts be passed for payment.

Mr. Lenhardtson proposed the adoption of the rules of the Hygiene Commission, as circulated among the members.

Dr. Rosenthal said that the proposed rules had not been properly discussed in the commission. He objected to the proposal for making agreements with manufacturers by which the commission would share the profits on the sale of dentifrices and brushes. This was discussed in London in 1911 and rejected, as it was felt that the F. D. I. could have nothing to do with commercial matters.

The President agreed with Dr. Rosenthal: "It was decided in London that it would not be wise to make such a proposal part of the rules of the Hygiene Commission."

Dr. Jessen agreed to omit the proposal.

M. Villain objected to the use of the word "honoraire" in Rule 7, and suggested "indemnité" instead.

Dr. Van der Hoeven said this only had reference to the finances of the commission, but he accepted the alteration.

The elections of honorary members and ordinary members of the Hygiene Commission, and rules as amended were agreed to.

Report of Commission on Bibliography.

M. Huet submitted the following recommendations of the Commission on Bibliography:

(1) That the national committees of each country endeavor to appoint representatives for the Commission of Bibliography and Documentation; and that, pending these appointments, all national committees should undertake to collect and transmit all useful information.

(2) That the representatives of national committees should send, before July 1st, an annual report to the commission, which shall be included in the report presented to the session of the F. D. I.

(3) That the title of the commission be enlarged, as follows: Commission of Bibliography, Documentation, and Statistics.

Dr. Rosenthal said it was proposed that a budget should be voted for the work of the commission to permit the appointment of a clerical assistant at a cost not exceeding £50. It was important to keep information up to date and secure permanent records of dental matters from all points of view.

M. Huet said the work would include information as to dental publications and societies, lists and registers of dentists, public, military and naval dental services, etc., in all countries.

The recommendations were adopted and approved.

Report of the Committee on Deontology.

M. Villain submitted the recommendations of the committee in regard to an International Code of Ethics (Déontologie).

It was agreed that Mr. Harrison be added to the committee, consisting of Dr. Rosenthal (chairman), Dr. Aguilar and Dr. Schaeffer-Stuckert, who are desired to draft an International Code of Ethics.

The recommendation "That all dental

schools should include in their programs of instruction the principles of dental ethics," was adopted unanimously.

Election of a Member.

On the motion of Dr. BROPHY, Dr. M. L. Rhein (New York) was elected a member of the F. D. I.

Report of the Education Commission.

Dr. AGUILAR submitted the two recommendations of the Education Commission.

It was resolved, on the motion of Dr. GODON, seconded by Dr. GUY, "That the Subcommittee of the Education Commission be requested to present a detailed report on the three resolutions on Dental Pedagogics of 1910-11, and to report in 1914."

It was also resolved, on the motion of Dr. AGUILAR, seconded by Mr. BROOKS: "That this Commission on Education of the F. D. I. suggests to the Organization Committee for the International Dental Congress, 1914, that it is desirable to solicit from the various dental schools exhibits illustrating the methods of instruction."

These were unanimously adopted.

Opening of Laval University Dental School.

The following letter was read from Dr. Eudore Dubeau, president and director of the School of Dental Surgery of Laval University, Montreal: "The School of Dental Surgery of Laval University at Montreal will inaugurate, October 1st next, its new building, which it owes to the generosity of the government of the Province of Quebec and the cost of which will amount to 1,500,000 francs (£60,000). On this occasion there will be a grand reception, at which the Prime Minister, university delegates, and other teaching bodies will be present, and we should be happy to see the F. D. I. represented. In the hope that you will do us this honor, we beg you to accept our respectful greetings." Dr. Dubeau also telegraphed regretting his absence.

On the proposition of Dr. AGUILAR, seconded by Dr. BROPHY, Dr. Godon was elected to represent the Federation at Montreal.

Coming Opening of Evans Institute, Philadelphia.

Dr. RIETHMÜLLER (Philadelphia) announced that the Evans Institute and Dental Department of the University of Pennsylvania would be opened in July or October of next year. It would be most fitting that the F. D. I. should send a representative to the inauguration, as many members of the F. D. I. were alumni of Pennsylvania University.

On the proposition of Dr. BROPHY, seconded by Dr. AGUILAR, it was agreed that the president nominate a delegate to represent the Federation at Philadelphia.

Dr. SCHAEFFER-STUCKERT said that a bronze replica of the Miller medal was given for the recent inauguration of the Dental Institute in Berlin. Dr. Aguilar had kindly offered to provide a similar replica for the Evans Institute.

The PRESIDENT suggested that this should be presented by the F. D. I. delegate.

Officers of the International Dental Congress.

The PRESIDENT reported the nomination of officers of the International Dental Congress, 1914, by the Committee of Organization.

Dr. SHAEFFER-STUCKERT proposed that the nominations of the Committee of Organization be approved.

Dr. AGUILAR seconded, and the nominations were approved.

Miller Prize Fund.

Dr. AGUILAR presented the accounts and the report as follows:

The Board of Trustees of the International Miller Prize Fund reports—That the board has received the following report from its secretary:

TO THE BOARD OF TRUSTEES OF THE INTERNATIONAL MILLER PRIZE FUND:

Gentlemen,—Your Hon. Secretary begs to report as follows: Since the last meeting of our board on August 28, 1912, the Executive Council of the F. D. I., in awarding for the second time the International Miller Prize,

has elected Dr. Charles Godon of Paris to be the recipient of that honor, and in accordance with our rules we should deliver at this meeting the medal and prize to Dr. Godon. Some material difficulties in obtaining from Germany the die of the medal by Prof. Werba prevent us from the fulfilment today of that formality, but this will be remedied in accordance with the permission of Dr. Godon.

During the year we have not received any new donations and have collected only the interest due on the bonds and securities which the Fund possesses—interest amounting to 2,268.42 francs.

Your Treasurer's account is as follows:

TREASURER'S ACCOUNT—INTERNATIONAL "MILLER PRIZE" FUND.

1912.	DR.	Fr.
Aug. 28.	Cash in current account at the Deutsche Bank, Marks, 4,239.95	5,300.05
	Cash in current account in Francs	14,279.88
Dec. 31.	Credited by Deutsche Bank for interest on "Cédulas Hipotecarias Argentinas," Marks 581.60	697.92
" 31.	Credited by Deutsche Bank for interest on German Reichsanleihe, Marks 300	360.00
" 31.	Credited by Deutsche Bank on cash in account current, Marks 49	58.80
1913.		
June 30.	Credited by Deutsche Bank for interest on "Cédulas Hipotecarias Argentinas," Marks 579.15	694.98
" 30.	Credited by Deutsche Bank for interest on German Reichsanleihe, Marks 300	360.00
" 30.	Credited by Deutsche Bank on cash in account current, Marks 80.60	96.72
		Fr. 21,848.35

1912.	CR.	Fr.
Aug. 29.	Payment made by Dr. Rosenthal to Glaser & Sohn, Dresden, for a medal	1,530.25
" 29.	Payment to Acheson Batchelor, London, for an illuminated album	254.35
1913.		
July 28.	Payment to Adalbert Milde & Co., Dresden, for foundry of medal	150.00
" 28.	Charge made by Deutsche Bank for safekeeping of securities, Marks 16.85	20.22
Aug. 22.	Balance to the credit of the Fund: Cash at the Deutsche Bank, Berlin, in Marks 6,143	7,371.60
	Ditto, in Francs	12,521.93
		Fr. 21,848.35

INVENTORY OF CAPITAL.

Our account of capital at the bank is as follows:

1913.		Fr.
Aug. 22.	Value of 15,000 Marks nominal of German State 4 % Bonds	19,162.50
	" " 11,000 Pesos nominal of Argentine State—"Cédulas Hipotecarias"	24,216.40
	Deposited in current account in Marks 6,143	7,371.60
	" " " " " Francs	12,521.93
		Fr. 63,272.43

In accordance with the resolutions passed by this Board and by the Council of the F. D. I., I will, if such is the pleasure of this committee, send before the end of the year a circular with a copy of the "Rules

and Regulations of the International Miller Prize" to all members of the F. D. I. and to the principal universities, colleges, and dental societies, with an invitation to nominate candidates for the next "Miller prize," which should be awarded in London next year.

Respectfully yours,

FLORESTAN AGUILAR.

The above report was accepted by the board.

We have received a letter from Dr. Godon, the recipient of the last Miller prize, in which he states that, while most highly honored by the F. D. I. with the award of the Miller prize, he accepts with deepest gratitude the Miller gold medal, but wishes to make donation to the Miller Fund of the money part of the prize.

This most generous action of Dr. Godon in making donation to the Miller Prize Fund of over 3000 francs is, in the opinion of this board, worthy of the thanks of the Executive Council of the Federation. This Board of Trustees has also decided to send a notice to all members of the F. D. I., and to prominent dental institutions, universities, and societies, announcing that the award of the next International Miller Prize will take place in London, in 1914, and that nominations of candidates for the prize should be sent at least six months in advance of the meeting—that is to say, not later than February 4, 1914.

Respectfully submitted by the Board of Trustees.

F. AGUILAR, *Hon. Sec'y.*

THE HAGUE, August 29, 1913.

Dr. AGUILAR, summarizing the report which he had presented, said it was satisfactory to know that the total capital of the fund was now 63,272 francs (£2530). They also warmly acknowledged the great generosity of Dr. Godon in making a donation to the fund of the money prize, 3000 francs (£120). The next award would be made in 1914, and they had decided to ask for the nomination of candidates not later than February 4th.

Dr. GODON said he wished to renew his expression of gratitude for the high distinction conferred upon him at Stockholm in his absence. He was extremely proud of this tribute, which was the highest recompense any man could receive from the profession.

Dr. BROPHY said he had heard from Dr. Read of Toronto that the Canadians had already raised $1000 for the fund, and hoped to increase this amount soon. In the States he had succeeded in getting $500 subscribed in the state of Michigan, and from Wisconsin he expected to get $250 more. It was very probable, therefore, that another $2000 would be paid into the account next year in London. They wanted to bring the fund up to $5000 from the United States alone, and he hoped to see the total fund increased to $15,000 at least, and ultimately to $20,000. He looked upon this fund as a living and working memorial of Miller, whom they all loved so much, and they were confident it would continue to do increasing good for the profession in recognizing eminent services to dentistry.

The PRESIDENT. We are very much indebted to Dr. Aguilar and the Trustees of the Miller Fund, who deserve our very hearty congratulations upon their excellent statement of affairs and their financial success. We appreciate also very highly the efforts of Dr. Brophy and others to increase the fund, and hope that he and they will be able to present a further handsome check at the next meeting in London.

Notice of Motion.

Dr. GODON suggested a modification of the rules to provide for the appointment of deputies in the unavoidable absence of members of the F. D. I. at annual meetings.

The PRESIDENT said the Executive would prepare an order of the day on the subject.

Date of Next Meeting.

The PRESIDENT announced that the next meeting of the F. D. I. would be held on Monday, August 3, 1914, at the University of London.

The Council then concluded its meeting.

The following telegram was received by the Executive of the F. D. I. from his Majesty the King of Sweden, "His Majesty the King has directed me to return his Majesty's thanks for your kind message.—BOSTROEM."

EXCURSION TO AMSTERDAM.

ON Saturday, August 30th, the Dental Societies of Holland organized a most enjoyable and interesting excursion to Amsterdam. Special train and tram arrangements were made for the members to go to Amsterdam and to the anatomical theater of the University, while the ladies of the party were driven to various places of interest in the city.

At the anatomical theater, Professor L. BOLK cordially welcomed the members of the Federation in French, and afterward delivered in English his lecture on "An Atavistic Rudimentary Molar in the Maxilla of Man." The lecture was illustrated by a unique collection of specimens and models of abnormal teeth and anomalies of dentition. A finer collection, or one so well arranged and mounted, has rarely, if ever, been shown to a dental gathering. According to his method of classification the fourth molar is called the "disto-molar," and is situated immediately behind the third molar, and the small bodies on the buccal aspect of the maxilla between the second and third molars he named "paramolars," and he suggested that the frequent appearance of these teeth might have a strong bearing on questions of evolution. Professor Bolk, summarizing the results of his examination of the dentition of 30,000 crania in the museum of the University of Amsterdam, dwelt upon (*a*) the non-eruption of the mandibular second premolar and the continued existence of the mandibular second deciduous molar until middle age; (*b*) the so-called maxillary fourth molar, which he demonstrated in some thirty specimens to be a single-rooted tooth with a molariform crown, existing buccally between the second and third maxillary molars ("paramolar" he named it), or behind the third molar (disto-molar); (*c*) the proximity of the roots of the teeth to the maxillary antrum, more especially in the region of the second and third molars.

At the conclusion, Dr. VAN DER HOEVEN proposed a vote of thanks to Professor Bolk for his kindness in giving the F. D. I. the results of his important original researches.

Mr. J. H. MUMMERY seconded the motion, and said they all appreciated very much what they had heard.

After inspecting the anatomical museum, the members joined the ladies at the city quay for a special steamboat trip to the famous castle at Muiden, the interior of which has been restored to seventeenth-century conditions with remarkable fidelity, even to the dress of the custodians. Lunch and tea were served *en route* and the return was made across the Zuyder Zee to the Naval and Shipping Exhibition at Amsterdam, where the rest of the evening was pleasantly passed.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

Fifteenth Annual Meeting, held at Old Point Comfort, Va., July 22, 23, and 24, 1913.

(Continued from page 337.)

WEDNESDAY—*Morning Session.*

The meeting was called to order at 9.30 o'clock, Wednesday, July 23d, by the President, Dr. Foster.

The first order of business was the Report of the Army and Navy Committee on Legislation, which was read by the secretary, Dr. Dean.

[This report was identical with that published in the report of proceedings of the National Dental Association at Kansas City—see COSMOS for November, 1913, vol. lv, pp. 1164–66.]

The Secretary then read the following resolution, which was on motion adopted by the association:

RESOLVED, That the Southern Branch of the National Dental Association, representing the state societies of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and West Virginia, and assembled July 22, 1913, at Old Point Comfort, Va., in annual session, hereby strongly approves the Dental Reserve Corps Act of March 4, 1913, because said act provides that all appointments shall be made by the President and confirmed by the Senate; and further authorizes the Secretary of the Navy to order the members of the said reserve corps to temporary active service, thus providing a ready means of meeting the dental needs of the *personnel* of the navy and marine corps with the service of men of the required skill and experience while developing a regular dental corps from men whose age at entrance precludes their having the required skill and experience; and be it further

RESOLVED, That this resolution be forwarded to Secretary Daniels, under the seal of the Southern Branch, and with the assurance that the profession of the several states represented will, if permitted, gladly co-operate with the Navy department in all efforts to attract to the navy dental service the best-equipped and most suitably qualified dental surgeons available through co-operative effort and a patriotic pride and interest in the welfare of the navy.

The Secretary next read the following resolution with regard to appointments to the Navy Dental Reserve Corps, which was adopted by the association:

RESOLVED, That the Southern Branch of the National Dental Association, in annual convention assembled at Old Point Comfort, Virginia, July 22, 1913, hereby expresses approval of the appointment, made April 23, 1913, by President Woodrow Wilson, by and with the advice and consent of the Senate, of Drs. Williams Donnally, Vignes E. Turner, and Geo. C. Küsel to membership in the Navy Dental Reserve Corps, and to acknowledge the recognition of the dental profession thereby implied.

The Committee on Necrology, through the chairman, Dr. DONNALLY, presented the following report:

Report of the Committee on Necrology.

Mr. President and Gentlemen,—Your Committee on Necrology beg leave to report that since our last meeting the Southern Branch of the National Dental Association has to mourn the death of some of its most valuable members, and desire to express sincere regret at the loss sustained. Not only does this association feel this loss, but the entire profession recognizes it, especially the members in the South, to whom they were best known.

The following are those who have died

during the past year: L. D. Carpenter, Atlanta, Ga., J. A. Hall, Collinsville, Ala., T. M. Allen, Tampa, Fla., Louis D. Archinard, New Orleans, La., P. H. Wright, Oxford, Miss., and Geo. S. Tigner, Atlanta, Ga.

Isaac N. Carr,
R. L. Simpson,
Williams Donnally,
Committee.

Motion was made and carried that the report be accepted, and that a memorial page be inscribed to these departed members in the records of the association.

The next order of business was the report of the Committee on Orthodontia, by the chairman, Dr. Jos. Eby, Atlanta, Ga., as follows:

Report of the Committee on Orthodontia.

As chairman of the Committee on Orthodontia, I would suggest that this branch of dentistry is at a stage of progress which merits a full and comprehensive digest at this time, without discounting the great work accomplished during the past twenty-five years by such men as Drs. Norman W. Kingsley, Talbot, Guilford, Jackson, Case, Angle, Ottolengui, and many others. Perhaps the past three years have brought out more of progress, and have founded this branch of dentistry on the basis of an exact science, by the great research work of such men as Dr. Alvin Oppenheim of Berlin, Dr. Frederick B. Noyes of Chicago, and others, who have gone so thoroughly into the histology and physiology of the causes of irregularity, and the establishment of the fact that the normal or ideal tooth movement is accomplished by a mild mechanical stimulus, which places diagnosis as to causes and the mechanical application as to forces on a positive basis.

The greatest step toward successful orthodontia has been the establishment of the wonderful course given by Dr. Angle in his School of Orthodontia, which beyond a doubt has the finest selection of all of the highest qualified specialists in all of the allied branches of orthodontia which could be gathered out of the world today.

This course is absolutely thorough, and the knowledge of both theoretical and practical orthodontia qualifies the graduates of this school to be absolutely the foremost exponents of this branch of dentistry by virtue of their wonderful training. Through the medium of Angle's classification, founded upon the basis of normal occlusion, and with a knowledge of the facts presented by the great research work of Drs. Oppenheim and Noyes, previously mentioned, Dr. Angle personally has applied his wonderful mechanical genius in an improved form of appliance, which produces a stationary anchorage and an absolutely perfect control of every form of tooth movement, eliminating all liability of movement of anchor teeth, or the development of unexpected complications, which are so often caused by a misapplication of force.

With an intimate knowledge of this new appliance and an expert skill in its insertion, we are now able to make an ideal correction of any form of irregularity.

Founded upon the basis of a return to normal conditions, a new phase of the latitude of orthodontia has been established in the restoration of constricted nasal development by the application of appliances for the development of the nasal cavities to their normally intended size, which goes back one step farther than the mere correction of the irregularity of teeth in the cases where mouth-breathing, caused by adenoids, has so seriously disarranged normal respiration and demoralized the balance and harmony of all the facial muscles. During the past five years, Dr. V. H. Jackson of New York has made wonderful progress in the improvements on his wonderful system, with its ideal application of stimulus for the accomplishment of tooth movement in a normal and painless manner, which cannot be passed without the most careful notice and the highest praise.

The profession at large is looking forward with a great deal of anticipation to the publication of the second edition of Dr. Jackson's text-book, which in many ways is going to be a revelation

in the practice of orthodontia by the general practitioner when the services of specialists cannot be secured, for his system during the past ten years has made possible the wonderful improvement, if not the perfect correction, of thousands of cases of malformation which practitioners at large would have felt loath to undertake without the Jackson appliance.

Orthodontia is no longer a speculation, and almost any dentist may feel sufficient confidence with the appliances now at hand to undertake the correction of an irregular condition which it may fall to his lot to meet. The time has come when no dentist can underrate the necessity of possessing a fair knowledge of the causes and the diagnosis of malocclusion, the mechanical application of corrective means, and of applying such knowledge in his practice.

I hope this partial report will convey a few ideas of the condition of active progress which orthodontia is making, for at the present moment it is unquestionably borne on the shoulders of some of the greatest scientists which any branch of our profession has ever produced.

Jos. Eby, *Chairman.*

Dr. Carr moved that the report be adopted. [Motion carried.]

Motion was then made and carried to adjourn until Thursday morning session.

Thursday—*Morning Session.*

The meeting was called to order on Thursday morning, July 24th, at 10 o'clock, by the president, Dr. Foster.

The first order of business was the report of the Committee on the President's Address, which was read by Dr. T. T. Moore, Jr., as follows:

Report of Committee on President's Address.

Inasmuch as we have carefully considered the splendid address of the president of this association, and recognize the rightfully parental attitude, we recommend—

That the Southern Branch of the National Dental Association continue its organization and its relation to the parent body, and that our next meeting be held more nearly in the center of the territory represented by its membership.

We feel that the Southern Branch of the National Dental Association has a distinct mission to perform; and that the cause of its inception and growth must be recognized. The sacred history of its early life and its splendid record in professional accomplishments, persuade your committee to ask for a unanimous vote of confidence in the association, and its continuance as before related.

Respectfully submitted,
B. Holly Smith,
R. W. Carroll,
Thos. T. Moore, Jr., *Committee.*

The next order of business was the report of the Committee on Chemistry, which consisted of a paper by Dr. N. A. Teague, Augusta, Ga., entitled "Metallurgy."

[This paper is printed in full at page 430 of the present issue of the Cosmos.]

Discussion.

Dr. B. Holly Smith, Baltimore, Md. The scientific way in which the essayist approached his subject made me hope that he had something practical to offer. I rise to emphasize the usefulness of gold foil as a filling material rather than to discuss the paper critically. It is known to us all that the manufacture of what is known as non-cohesive gold happened to be the secret of one man, who died without having revealed it; Abbey's non-cohesive gold can no longer be purchased. There is no gold of this kind manufactured in America which can be favorably compared with that product.

While I appreciate the ability with which the essayist described the wonderful workmanship of the orientals in the use of gold for ornamental purposes and in the arts, I had hoped that he would tell us what method would produce something like Abbey's non-cohesive gold. A number of our manufacturers produce a non-cohesive gold which is

made cohesive by annealing, but Abbey's gold was not affected that way.

A distinguished gentlemen from New York has said that the chief virtue of non-cohesive gold was the readiness with which it might be removed, should an abscess occur. I do not believe that. There is no reason why a non-cohesive gold filling should not be as dense and have as high specific gravity as cohesive gold. I saw this tested out in Baltimore once, when Dr. Head made the claim that he could introduce more cohesive gold in a given space than it was possible to do with non-cohesive gold. The test was accordingly made, and the man who worked with non-cohesive gold obtained a higher specific gravity than Dr. Head did, who consequently lost his wager.

I would like to have Dr. Teague bend his energies to showing us and the manufacturers how to produce a gold that will compare favorably with that made by Abbey.

Dr. M. D. Huff, Atlanta, Ga. The essayist, as is his custom, has presented us with a beautiful, scientific, and symmetrical paper.

In the production of gold by the wet process with aqua regia, the latest formula for aqua regia, as recognized by the pharmacopeia, is 820 grams of hydrochloric acid to 180 grams of nitric acid. This seems to be the proportion now used and officially recognized.

As to the working of gold, we are obliged, of course, to admire greatly the work of the Japanese, but as American dentists we can derive a great deal of consolation from the fact that we do not have to doff our hats to any other race, American dentistry standing at the head in the accomplishments in actual tooth preservation by the application of gold.

I would like to ask the essayist if, in his research, he has been able to find any reason why non-cohesive gold seems to exert a preservative influence upon tooth structure to a greater degree than does cohesive gold.

Dr. Wms. Donnally, Washington. I wish to speak of one feature that has been brought out in the paper, namely, the use of disappearing models of wax in connection with the Taggart patent. A study of this matter, which has been made in Washington, has shown that the Egyptians made castings from disappearing wax models more than eighteen hundred years ago. It has also been shown that Dr. Hollingsworth, Dr. Simpson, and other dentists did work in this way years before the Taggart patent was granted. The practical and general use of this method, and the machine for it, are undoubtedly largely due to Dr. Taggart, who demonstrated his ideas to the profession in New York some years ago, thereby connecting his name officially with the cast gold inlay.

This, as well as many other instances, shows that we are doing today practically the same things that were done hundreds of years ago, and are talking about them as new discoveries.

Dr. Smith. I would like to make an explanation with regard to my previous remarks. I did not mean to reflect on any manufacturer's gold foil when I made the statement that there had never been any foil produced in this country which compared favorably with Abbey's. I meant to say that no other foil has been produced which could be manipulated in the manner in which we manipulated Abbey's gold. Globe foil, manufactured by White, is non-cohesive, but we can, in manipulation, impart to it the cohesive quality. The foil that resembles Abbey's most closely is Woolrab's. I have introduced a good many fillings of Globe foil, but it has always been an embarrassment to me, in the insertion of such a filling, to find a cohesive quality caused by the manipulation of the gold. I do not say that good fillings cannot be made with this gold, but, unlike Abbey's, it seems to possess a strange quality, which is embarrassing to me.

Dr. S. W. Foster, Atlanta, Ga., complimented the essayist on his paper, and thanked him for his contribution.

Dr. Teague (closing the discussion). In closing the discussion I wish to thank you for the courteous reception accorded to my paper. I fully appreciate the difficulty of discussing offhand a paper

on chemistry or metallurgy. However, if by this review of certain chemical and metallurgical changes that take place in metals, any of my hearers should be impelled toward further investigation and research, my efforts to stimulate interest in this direction shall not have been in vain.

I am unable to answer Dr. Smith's question as to how non-cohesive foil is made.

Dr. Smith. Gold foil is naturally cohesive, but I asked how non-cohesiveness was secured in the old foils.

Dr. Teague. I cannot answer that. I have not been able to find how that is done, but I shall keep on trying.

With regard to Dr. Huff's question as to whether non-cohesive gold preserves the teeth better than cohesive, I do not know whether there is any preservative quality in the gold itself. The explanation is to be found in the workmanship of the practitioners forty and fifty years ago. It seems to be a fact, however, that non-cohesive foil has a more preservative effect on tooth structure than cohesive gold, as we have seen a great many non-cohesive gold fillings which have preserved the teeth for fifty years, but never a cohesive filling that has lasted nearly that long.

The next order of business was the reading of a paper by Dr. I. N. Carr, Durham, N. C., entitled "Electricity in Dentistry."

[This paper is printed in full at page 439 of the present issue of the Cosmos.]

Discussion.

Dr. H. W. Campbell, Suffolk, Va. One of the principal points of the paper was the sterilization of the mouth by the spray prior to operation. I believe that before any work is done in a mouth, it should be thoroughly sprayed and disinfected. This has been duly emphasized yesterday in Dr. Skinner's paper on oral prophylaxis. In connection with the spray, the use of the disclosing solution which Dr. Skinner referred to would be admirable. Preventive medicine is occupying the minds of the medical profession today, and should take a firmer hold of the dental profession. Many think too much of the social feature of these meetings, and probably go away content in their ignorance, instead of receiving an inspiration for new methods and real research work. If more of us engaged in scientific research, we would make more rapid strides.

Dr. Robin Adair, Atlanta, Ga. The best friend I have in my office is the compressed-air equipment, because of its valuable assistance in prophylaxis in pyorrhea.

I would like to speak for a moment on one or two practical points concerning this subject. First, the spray outfit. The compressed air which is furnished in some office buildings is unfit for use in the patient's mouth, as it is compressed in a basement where there is more or less foul air, dust, etc. When this air is blown through a piece of cloth, it is surprising to note how much impurity it contains. It is a very easy matter to filter such air before using it with an improvised filter made in the following manner: A piece of pipe, two inches in diameter and six inches in length, is loosely plugged with cotton and connected with the air-supply pipe. Once a month this pipe section is removed, and the cotton renewed, when it will be found to be almost black with filth, and laden with bacteria, water, etc.

If the operator does not have a hot-air syringe, hot air may be supplied in the winter time simply by placing a small Bunsen burner at a point about three feet from where the pipe enters the tubing. This burner is lighted in the morning, and will heat the air all through the day. This appliance works on the same principle as a water-back in a stove. I find that in pyorrhea work hot air is one of the best means of diagnosis. Sometimes we cannot introduce a probe into a pocket, but with compressed air and a fine syringe point we can distend the gum, and, if we have used the disclosing solution, make a diagnosis.

In using the disclosing solution, one should be cautious not to spread it all over the mouth.

In regard to pressure, I have never found it necessary to use a reducing valve. I should like to increase the pressure to above forty pounds, because I have never yet found enough pressure for my work.

There is one point in connection with prophylactic work that I would like to emphasize. In using the spray the current of air should be directed against the teeth in this way [illustrating]. One of the greatest troubles we have in prophylactic work is leaving pumice at the free margin of the gum. The stream of air should be directed so that it will wash these pumice crystals away, because they are an irritant and cause a great deal of damage.

The electric surgical lamp is one of the most valuable aids in diagnosing dead teeth and in filling root-canals. I am always interested in anything that has to do with electricity, because of the many uses to which it can be put. Dr. Kelley of Portland suggested to me the use of a nasal spray with a big bulb on it. By placing a finger above it and applying it between the teeth, we can clean the interstices most thoroughly.

In every office a lot of samples are left, and of these I dispose by pouring them all into a nasal douche bottle, and using the mixture as a spraying solution.

I use Dr. Skinner's disclosing solution entirely, as it is the only one I have ever been able to use successfully.

Dr. EWALD. Dr. Adair speaks of using over forty pounds of pressure in pyorrhea pockets. I have never seen him use it, but I would like to know how he protects himself from the result of forty pounds of pressure in a pocket.

Dr. ADAIR. I had reference to the spray syringe.

Dr. EWALD. I mean the spray.

Dr. ADAIR. I use a chip-blower which has forty pounds' pressure to distend the pocket. When I use the spray I allow the pressure to get to the point of forty pounds, and we hardly feel it. I think in the clinic yesterday Dr. Skinner used the Dunlop vapor under thirty and forty pounds of pressure.

Dr. DE LOS HILL, Atlanta, Ga. I might say that I could almost as well dispense with my engine as with my electrical appliances or electrical switchboard. A well-equipped switchboard, with which he can control every instrument to such advantage, is the best investment of sixty or seventy-five dollars that the dentist can make. I take it for granted that every owner of a switchboard uses a water-heater. This, in connection with the spray, is one of the most valuable attachments. It is most unpleasant to put cold water in the mouth, especially for persons with hypersensitive teeth, and they greatly appreciate tepid water. I had a switchboard designed and made with the attachments in the back, which gives a great deal better appearance to the office than one with a lot of wires dangling from it. If there is anything that looks badly and is difficult to keep clean and presentable, it is the four sets of wires in the average switchboard, which catch every particle of dirt and dust when the office is being cleaned. For that reason I have them concealed, which produces a great deal better appearance.

There are in the switchboard many other features, too numerous to mention, that I would not be without.

Dr. F. H. SKINNER, Chicago. Dr. Adair spoke of using compressed air for locating pyorrhea pockets. Wherever there is gingivitis, there is an irritant which is sometimes difficult to find. It may be a bacterial accumulation on the side of the tooth, a rough filling, a rough tooth surface, or a pyorrhea pocket just starting. The last-named condition is sometimes difficult to diagnose, for the gum hugs the tooth very tightly, until the vitality of the dental ligament is lost. With low pressure in the Dunlop vapor machine and a long, slender, blunt needle, known as the Robert Good pyorrhea needle, I have been able to blow the tissue back and detect deposits which I would have overlooked without this outfit. Compressed air can be applied in the same way for diagnostic purposes.

Dr. CARR (closing the discussion). In regard to the water-heater, every well-

equipped switchboard should have one. Dr. Adair spoke of not being able to obtain sufficient pressure. To those who do not want to invest money in an electrical pump, I would suggest the following arrangement: I have in my office an ordinary beer pump attached to a twelve-gallon tank, this pump being run by water. This pump is kept running automatically all the time, giving a constant pressure of sixty pounds, which is easily regulated by the outlet cock. I wish to thank the audience for the kind reception accorded to my paper.

The Executive Committee, through the chairman, Dr. Turner, asked the sense of the association with regard to the election of officers.

Dr. B. HOLLY SMITH moved that the election of officers be set for 12 o'clock. [Motion carried.]

The next order of business was the reading of a paper by Dr. H. W. MORGAN, Nashville, Tenn., entitled "Dental Education." This paper was read by the secretary, Dr. Deane.

[This paper is printed in full at page 460 of the present issue of the COSMOS.]

Dr. HILL, chairman of the Clinic Committee, reported that clinics would be given in the afternoon in accordance with the printed program.

Dr. BRABSON, treasurer, then made the following report:

Report of the Treasurer.

Receipts.

Balance on hand from 1912	$184.73
Dues collected, 152 at $5 each	760.00
	$944.73

Disbursements.

Paid Treasurer National Dental Association	$589.00
Printing	1.50
Stamps and expressage	7.50
Badges	6.25
Treasurer's expenses	49.25
	$653.50
Balance on hand for 1913	$291.23

Respectfully submitted,

B. D. BRABSON, *Treasurer.*

Motion was made and carried that the Report of the Treasurer be accepted.

The next order of business was the selection of the place of the next annual meeting. The vote of the association was taken, and Atlanta was selected as the place for the next meeting.

ELECTION OF OFFICERS.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—Dr. W. A. Deane, Tampa, Fla.

First Vice-president—Dr. R. W. Carroll, Beaumont, Texas.

Second Vice-president—Dr. M. D. Huff, Atlanta, Ga.

Third Vice-president—Dr. T. T. Moore, Jr., Columbia, S. C.

Recording Secretary—Dr. Joseph Eby, Atlanta, Ga.

Corresponding Secretary—Dr. J. L. Williams, Jacksonville, Fla.

Treasurer—Dr. B. D. Brabson, Knoxville, Tenn.

Executive Committee—Dr. N. A. Teague and Dr. J. E. Chace, to take the places of Dr. H. C. Hassell and Dr. R. W. Carroll.

The next order of business was the installation of the newly elected officers, after which the association adjourned *sine die.*

PENNSYLVANIA STATE DENTAL SOCIETY.

Forty-fifth Annual Meeting, Philadelphia, Pa., June 24 to 26, 1913.

(Continued from page 360.)

THURSDAY—*Morning Session.*

(Continued.)

The next order of business was the report of the Committee on Oral Hygiene and Public School Dental Education, by Dr. G. S. SCHLEGEL, Reading, as follows:

Report of Committee on Oral Hygiene and Public School Dental Education.

PROPOSED CHART AND BOOK ON ORAL HYGIENE FOR SCHOOLS.

Your Committee on Oral Hygiene and Public Dental Education begs to report the inactivity along the lines outlined in the 1911 report. The idea outlined was to prepare a suitable chart for teaching oral hygiene in the public schools; also to write or to have written a proper text-book on oral hygiene for use in the schools. However, after a thorough investigation of the proposed methods, the committee found that an "oral hygiene chart," however comprehensive it might be, would only be purchased by a limited number of schools, and therefore fail in its purpose. To have the society assume the burden of the expense is entirely out of the question. A text-book on oral hygiene written by a competent dentist should be produced, and we believe would have a ready sale.

ORAL HYGIENE FILMS.

On the other hand, the motion-picture film is gaining in popularity as a teacher, and if this method becomes general in the public schools, we hope a number of short films showing the importance, value, and care of the teeth will be produced. The present film of the National Dental Association cannot be termed popular, with all due credit to those who labored so hard to produce it and bring it before the public.

ACTIVITIES OF LOCAL SOCIETIES.

The activity of the oral hygiene committees of the various local societies throughout the state, many of which were appointed through the activity of your committee, have some very interesting and progressive reports to make.

The Luzerne and Lackawanna Dental Society, through Dr. W. C. Schofield, secretary, reports the society carrying on its clinical work at the city hospital. The free dispensary there has provided dental treatment for one hundred and forty to one hundred and seventy-five children per month. Several members of the society have lectured on oral hygiene in the schools. A dental inspection of the children of from eight to twelve years has just been completed in the city of Wilkes-Barre. A motion-picture reel on oral hygiene has been purchased from the National Dental Association, and shown several times lately.

The York Odontological Society reports the probability of a free clinic in the near future, in part due to the cooperation of the Visiting Nurses' Association.

The Bradford Dental Society, through Dr. F. J. Urban, secretary, reports thorough dental work for twenty-five children of the McKean County Children's

Home; also that a dental examination is being made of 2400 pupils, but on account of a scarlet-fever epidemic, a complete report is impossible. A talk by Dr. V. H. McAlpin on "Teeth and Efficiency" at the teachers' institute provoked general public interest.

The Odontological Society of Western Pennsylvania, through Dr. H. W. Heckel of your committee, reports as follows:

"Members of the Oral Hygiene Section have been instrumental in securing the establishment of dental clinics in quite a number of the asylums, hospitals, penal and other institutions in the western part of the state, and have, with the assistance of students from the dental school of the University of Pittsburgh, supplied dental service to the inmates of the various institutions, a list of which follows: City Poor Farm and Insane Asylum at Marshasea; Juvenile Court Industrial School at Thorn Hill; Western Penitentiary; Episcopal Church Home; Children's Hospital; School for Blind; Crippled Children's Home; Pittsburgh Tuberculosis Hospital; Playground Association; Phipps Settlement; Irene Kaufmann Settlement; Coleman Home for Boys; Associated Charities; Gusky Orphan Asylum; Home for the Friendless."

The Council of Jewish Women of Pittsburgh have a building near the center of the city, in which they have given a room and furnished it with an up-to-date dental outfit, also a lady in charge to assist the operator. The clinic will be open every afternoon in the week, and at present is being supplied with volunteer workers. We hope to show the city council what a benefit this is to the community, and possibly later establish a paid operator. The clinic is for school children only.

The Central Pennsylvania Dental Society reports dental talks before the school board of Altoona and distribution of tooth-paste and brushes to children too poor to buy them.

Dr. S. B. Luckie, chairman of the Oral Hygiene Committee for Delaware County, reports in part as follows:

"We have distributed in the public schools of Chester, Media, and Clifton, in the lower grades, six dozen of Lee S. Smith & Son's school posters. May 8th, Dr. A. Kassab gave a talk to teachers and others interested in children's playground association work, on the subject "The Relation of the Health of the Mouth to the Health of the Individual."

Last November the board of trustees of Chester Hospital created a dental staff for that institution, the members appointed to the staff being Drs. R. M. Cox, Wadea Kassab, and S. B. Luckie, chief. The object of having a dental staff originally was to assist in surgery when dentists were needed, attend to cases among the indoor patients who might require dental services, and lecture to the nurses. Later it was decided by the board to start a dental clinic for children under fourteen years of age.

On January 2d the clinic was opened. The clinics are held on Thursday of each week from four to six o'clock; we have treated 110 children up to 1st of June. Dr. Cox gave one lecture to the nurses, the graduating class, on the anatomy of the teeth, jaws, and associated parts. Dr. S. B. Luckie has given two lectures, one on "Mouth Inspection" and one on "The Causes and Prevention of Dental Caries."

This report shows the recognition of the dentist in the hospital, which should be encouraged wherever and whenever possible.

The Reading Dental Society, through the chairman of your committee, reports the fourth annual dental inspection of the pupils of the first grades of the public schools. The other grades, including the high schools, get a dental examination along with the general physical examination made of pupils by physicians under the new school code. The medical examiners and dental society are working in harmony. The school board, upon the recommendation of the Reading Dental Society and the medical examiners, recognizing the great value of a thorough dental inspection, are considering the advisability of a corps of paid dental inspectors aside from the medical inspectors. The fourth

year of our free dental dispensary has been completed with a greater number of patients and number of operations than in any previous year. Dr. C. V. Kratzer, president of our state society, delivered a lecture to the high school for boys on "The Value of Mastication." Dr. W. H. Scholl, charter member of the State Society, is spending his retired days very successfully by instructing the school children of all grades, both city and rural, by means of charts and models, in the importance of the teeth. He has spoken to 1450 pupils in 48 schools, from December 1912 to April 1913, or a total of 3000 children and 102 schools, since he began this noble work. Two members of the society constitute a press committee, who write timely articles for the local newspapers once a month. The papers have given prominence and splendid headlines to the articles written for them. This is a method of bringing the truth to the public, and these articles, given such prominence, will be read. It is to be hoped that other societies will do likewise.

The Committee on Oral Hygiene of the Lycoming Dental Society is pleased to report that, after long effort, a free dental clinic was established in Williamsport about October 1912, and continued every school day during the school year.

The progressive school board furnished a dental office outfit and material. The Williamsport Hospital furnished their free clinic room, every afternoon, with heat, light, and a nurse.

The dentists of Williamsport, partly members of the Lycoming Society, partly not, gave one-half day of free service to the dental clinic.

A committee of dentists, the superintendent of city schools, the health officer of the city, and a committee from the board of directors, met and arranged to have the city school teachers send a certain number of pupils that were entitled to free dental service to the clinic each day, and usually from three to five were present, sometimes more than could be seen professionally, and a few times none came.

The mothers and teachers aid societies, the health officer of the city, some of the school directors, and others agitated this matter, and when it was presented to the board of directors, it received respectful attention, and after some delay was acted upon favorably.

We have reason to believe that the free dental clinic has been a success from every viewpoint, and that it is so regarded by the dentists, the public, and the patients.

The work in Philadelphia has advanced, with some notable progressive changes. The purpose of the volunteer committee in charge has been fulfilled in obtaining from city councils an appropriation for a chief of the dental dispensary service as a division of the bureau of health. Included also in the appropriation for 1913, provision has been made for two additional school branch clinics and four additional assistant dentists, constituting now a central office of two rooms in city hall and three school branches. The location of these branches is governed by geographical and sociological requirements. The corps at present consists of twelve assistant dentists, with a chief.

The volume of service rendered for the first five months of this year at the City-hall offices and one school branch appears in the following tables:

City Hall.

1913.

	Patients.
January	757
February	665
March	674
April	945
May	828
	3869

	Operations.
January	2378
February	2145
March	2185
April	2793
May	2534
	12,035

SOUTHWARK SCHOOL BRANCH.

1913.

	Patients.
January	386
February	252
March	225
April	363
May	344
	1570

	Operations.
January	695
February	585
March	551
April	772
May	685
	3288

On April 9th, Dr. McCullough addressed the Atlantic County Dental Society, at which were present representatives of the school board and city commission of Atlantic City, N. J., and within the same month the commission appropriated two thousand dollars for a dental clinic.

Mayor Blankenburg has appointed Dr. McCullough one of the six delegates to represent the city at the Fourth International Congress on School Hygiene, to meet in Buffalo August 25th to 30th of this year.

In conclusion, the committee wishes to state that each community has peculiarities of its own, and that a state committee can only furnish assistance in giving data gained from the experience of others engaged in the same kind of work; it cannot direct the work of local societies. We also believe that all the societies of the state are carrying on this work to a greater or lesser degree, and that the small seed sown a few years ago is beginning to bear good fruit.

The balance in the hands of your chairman is $29.45, as only $3.50 was spent this year for printing, postage, etc.

GEO. S. SCHLEGEL, *Chairman,*
P. B. MCCULLOUGH,
W. B. MAUSTELLER,
S. B. LUCKIE,
H. W. HECKEL, *Committee.*

The next order of business was the report of the Council.

Motion was made and carried that the report be adopted.

The next order of business was the report of the Committee on the President's Address, by the chairman, Dr. FUNDENBERG, as follows:

Report of the Committee on the President's Address.

Your Committee on the President's Address submit the following: The address contains recommendations which it is very desirable to have carried out. However, the committee do not see their way clear at the present time to recommend either the reorganization, the Relief Fund, or the Scientific Foundation plan as suggested, believing the time to be not yet ripe, but trust the time may come when it can be accomplished more satisfactorily than at present.

W. H. FUNDENBERG,
J. G. LANE,
Committee.

[*Clinics.* For the report of the series of clinics, see pp. 490–496.]

Dr. CAMERON, chairman of the Local Arrangements Committee, presented the following resolution with regard to the entertainment of the society at the annual meetings:

RESOLVED, That this society disapproves of the expenditure of any of its funds for the purpose of general entertainment of its members, as smokers, boat rides, and vaudeville shows, feeling that the time and moneys can be more profitably spent in the presentation and discussion of scientific papers.

Motion was made and carried that the resolution be adopted.

The next order of business was the installation of the newly elected officers, after which the society adjourned until the next annual meeting—Philadelphia, June 30 to July 2, 1914.

THE CLINICS.

WAX PATTERN TECHNIQUE. (By Dr. C. S. VAN HORN, Bloomsburg, Pa.)

This clinic embodied the use of wax forms in the construction of wax patterns for cast gold or cast porcelain inlays, as described by the clinician in an article published in the DENTAL COSMOS for 1912, page 973, under the title "The Wax Pattern: A Technique, Together with Appliances, etc., for Its Execution."

SOMNOFORM ANALGESIA, USING THE DEFORD INHALER. (By Dr. D. A. ZURBRIGG, Philadelphia.)

BEAKER FOR STERILIZING SOLUTIONS IN LOCAL ANESTHESIA. (By Dr. H. W. ARTHUR, Pittsburgh, Pa.)

The beaker demonstrated by the clinician, and suggested first by Dr. Mühlhäusler of Freiburg, Germany, is gold-lined, to insure the purity of the solution. Its bottom is depressed, to center the last drop of the solution. It is fitted with a lip, to direct the shank and needle of the hypodermic syringe to the center. By the use of the beaker, a local anesthesia solution can be sterilized and the contents withdrawn to the last drop without the hands coming into contact with the beaker or the solution. The clinician suggested that novocain-suprarenin could be boiled without detriment to the anesthetic properties of the mixture.

ETHYL CHLORID AND VASELIN AS ADJUNCTS IN COMPOUND IMPRESSIONS. (By Dr. G. F. LOGAN, Philadelphia.)

The clinician suggested that, if the compound be coated with vaselin just before it is inserted in the mouth, it would not adhere to the teeth and the other oral tissues. After the compound has been pressed into position in the mouth, it is held firmly in place, and every surface of the tray is sprayed with ethyl chlorid until the impression is thoroughly chilled.

THE VALUE OF BLOOD PRESSURE DURING GENERAL ANESTHESIA IN DENTAL PRACTICE. (By Dr. C. S. TUTTLE, Philadelphia.)

Dr. Tuttle demonstrated the value of nitrous oxid and oxygen anesthesia during an oral surgical operation performed by Dr. E. B. Gleason. The clinician also demonstrated the value of nitrous oxid and oxygen analgesia as an agent for overcoming the sensation of pain during the removal of carious portions from sensitive cavities and in several exodontic operations. The Teter gas-mixing apparatus was used in both clinics, and the administration of the nitrous oxid and oxygen was very successful in both cases.

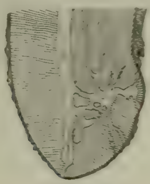
THE FILLING OF ROOT-CANALS WITH PRINZ' PARAFFIN COMPOUND. (By Dr. RICHARD H. RIETHMÜLLER, Philadelphia.)

The clinician demonstrated by charts drawn from celluloid casts of the pulps of various teeth the fallacy of expecting to extirpate with certainty the pulp from any root-canal, and of filling it subsequently with gutta-percha, ivory points, or any rigid or semi-rigid material. (See Fig. 1 to 7.) These illustrations show that even after the root-canal has been subjected to the sulfuric acid (Callahan) or the sodium and potassium (Schreier) treatment, the hermetic sealing of the orifices of the minute tributary canals, or the thorough filling of even such a comparatively simple canal as illustrated in Fig. 2, presents insurmountable difficulties unless a liquid material is introduced. Only the introduction of a permanently antiseptic, non-absorbable, non-irritating liquid, which after insertion will solidify without contracting, will permanently seal the dentinal tubuli, and will remain insoluble, guarantees a successful root-canal filling, as Dr. H. Prinz has convincingly shown in his paper on "Filling Root-canals with an Improved Paraffin Compound," pub-

lished in the DENTAL COSMOS for October 1912, p. 1081.

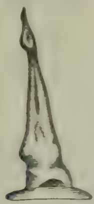
The clinician filled several roots in single and multi-rooted teeth, both in

FIG. 1.



Sagittal section of second bicuspid root, showing delta-like ramifications of root-canal.

FIG. 2.



Celluloid cast of pulp of upper central incisor.

FIG. 3.

Upper first bicuspid.

FIG. 4.

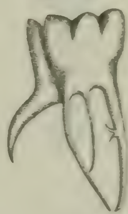
Upper second molar.

the upper and lower jaw, which had been mechanically and chemically cleansed in previous sittings, employing the following method: Under the rubber dam, the root-canal is wiped with acetone or absolute alcohol, and thoroughly dehydrated, either with an Evans' root-dryer or a platinum point connected with the electric switchboard. The thoroughly dried canal is lubricated with paraffin oil, and with sterile pliers one of the paraffin points, in which form the Prinz com-

FIG. 5.

Lower second bicuspid.

FIG. 6.



Lower first molar.

FIG. 7.

Lower second molar.

pound is furnished, is inserted in the orifice of the canal. The paraffin is then melted into the canal by means of the clinician's special instrument, fully described in the DENTAL COSMOS for March 1913, p. 342, which with a fine file may be given any shape suitable for the root-canal under treatment, and which, after

having been heated over an alcohol flame, retains the heat for a sufficiently long time to allow of a thorough introduction of the paraffin compound. (See Fig. 8.) Instead of this instrument,

Fig. 8.

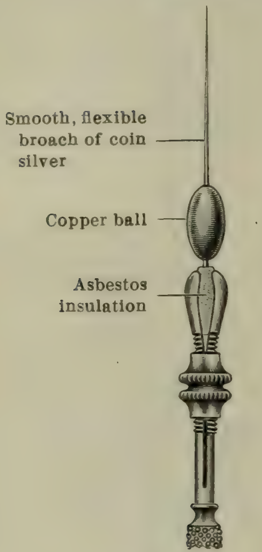
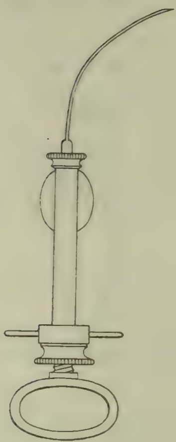


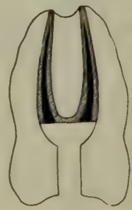
Fig. 9.



a silver point, connected with the electric switchboard and heated to not more than about 60° C. (140° F.) will be found suitable, if such a switchboard is available.

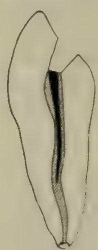
The paraffin compound may also be introduced by means of the all-metal syringe illustrated in Fig. 9, which is fitted with a metal reinforcement near the upper end, to act as a heat reservoir, and a fine and long flexible iridio-platinum hypodermic needle, such as is used in local anesthesia for conductive mandibular anesthesia. The piston is withdrawn, small pieces of the Prinz

Fig. 10.



compound are dropped into the syringe barrel, the piston is replaced, the whole syringe is dipped into boiling water, the iridio-platinum point is drawn through an alcohol flame to drive off any drops of water and insure sterility, and the liquid paraffin is slowly introduced into the canal, starting from the apex, and by a pumping motion driving all air out

Fig. 11.



of the root-canal. In order to press the paraffin compound firmly against the walls and securely seal up all the orifices of the dentinal tubuli, a heated copper point is introduced into each canal, as seen in the diagram, Fig. 10.

The advantages of Prinz' paraffin compound have often been pointed out. Even if a trace should be forced beyond

the apical foramen, it will cause no disturbance, the paraffin being absolutely bland and remaining inert toward the tissues, as has been demonstrated in thousands of cases of cosmetic restoration by hypodermic paraffin injections. In suspected cases of partial resorption of the root apex, the forcing of a small amount of paraffin beyond the root apex (see Fig. 11) will produce a rounded protecting layer, which will prevent further trouble and render the surgical operation of resection of the root unnecessary.

GIRARD COLLEGE DENTAL EXHIBIT. (Dr. S. H. CAMERON, Philadelphia, in charge.)

The exhibit from Girard College sent to the forty-fifth annual meeting of the Pennsylvania State Dental Society was composed of three illuminated frames, containing one hundred and thirty lantern slides. The middle frame was made up of forty slides of Stephen Girard and the college, among which were views of the nose-and-throat room and dental clinic rooms. The two end frames contained lantern slides analyzing twenty-two cases of malocclusion, with their accompanying X-ray studies, and specimen record cards from the files of the nose-and-throat and dental departments.

This exhibit was originally prepared to be sent to the Fifteenth International Congress on Hygiene and Demography at Washington, D. C. It was intended to point out, particularly, the value of the deciduous teeth and the part they play in assisting the development and later eruption of the permanent teeth, as well as their effect on the growth of the bones of the face and the tissues of the nose and throat. If the deciduous teeth are prematurely lost, the permanent teeth erupt unassisted and unprotected into various conditions of irregularities and malocclusion.

This exhibit has been placed in the dental department of Girard College, and is considered a valuable addition to the equipment. It affords an opportunity of calling the attention of the many visitors coming to the college to the character of the work being done for Girard College boys, and perhaps of interesting them in the care of children's teeth, as some of the disastrous results following the neglect of the teeth and their associated pathological conditions can be pointed out.

(I) TWO CAVITIES PREPARED UNDER GAS-OXYGEN. (Demonstration of the Pulmotor.) (II) RESULTS OF THREE IRIDIO-PLATINUM ROOTS IMPLANTED. (By Dr. T. D. CASTO and Dr. A. E. BASSETT, Philadelphia.)

This clinic consisted in showing two fenestrated iridio-platinum roots which had been implanted by the Greenfield method.

The core of the first had been removed after twenty-one days, and the root retained by splints for another forty days, at the end of which time the gum had receded and there was no indication of the root becoming firm in the bony socket.

The second one had a favorable history for six weeks, free from soreness, with no deep-seated pain, and the gums were healthy in appearance. This root was implanted in the mouth of a dentist, where all precautions against infection were taken. At the end of six weeks, it was necessary to place a splint in the mouth, after which the gums gradually folded down. There was a great amount of irritation accompanying the implantation of the root. At the end of twelve weeks, however, there was no indication of the implanted root becoming firm. The iridio-platinum root was then removed, and it was seen that the core had been entirely resorbed.

Drs. Casto and Bassett also demonstrated the use of the Pulmotor for resuscitating patients after asphyxiation.

The clinicians also demonstrated the use of nitrous oxid and oxygen for producing analgesia. Under the analgesia a cavity was prepared to the entire satisfaction of the patient.

TREATMENT OF SENSITIVE DENTIN DUE TO ABRASION OR ACID EROSION. (By Dr. J. C. HERTZ, Easton, Pa.)

When there is no softening of the tooth structure, the dentin is dried with

warm air, and vaselin is applied to the gum tissues. A cotton roll is also applied to extend the tissues and to prevent contact of moisture with the surface to be treated. Pure chlorid of zinc in the form of melted crystals is applied, preferably with a platinum point, although steel can be used. The instrument is then connected with a rheostat, by means of which the heat is very gradually increased, thereby driving the drug into the tubuli more thoroughly than by intermittent heat.

With the aid of an anesthetic, inhaled through the nose and producing the analgesic stage, the operator can cauterize most of these cases of abrasion and erosion occurring at the gingival margins or morsal surfaces, with very good results and without leaving any discoloration.

Method of Correcting Imperfect Margins of and Making Additions to Cast Gold Inlays. (By Dr. W. W. Booth, Pittsburgh, Pa.)

Occasionally a cast inlay shows some imperfection, especially at the cervical margins. The making of a new casting is not necessary, as a perfect restoration may be secured in a few minutes by the following procedure:

If, for example, an inlay presents a bad joint at the cervix, a piece of 1/1000 platinum inlay foil is cut as long as the extent of the bad margin and wide enough to extend just under the edge of the gold inlay and over the cervical margin of the tooth when replaced in the cavity. The platinum is attached to the gold inlay with hard sticky-wax along the line of imperfection, allowing, however, no wax to remain on the cavity surface of the inlay. With the platinum thus tacked in position, the inlay is returned to the cavity and the platinum burnished to the tooth margin, forcing the wax into the bad joint. The whole is then cooled, removed, and a small amount of investment material, mixed fairly stiff, is placed on the back of the inlay and over the platinum to hold it securely when soldering. The investment is then dried out and 22-karat solder is flowed into the joint.

With proper care, the soldering may be done in less time by placing the invested piece in dry investment material.

Many applications of this simple method may be made in correcting or altering the shape of inlays, and in raising the edge of an inlay that is a little below the margin of the cavity.

(1) "Cast Inclined Plane." (2) "Standardizing the Investment Process and Simplifying the Casting Process." (By Dr. F. L. Davenport, Wilkes-Barre.)

(1) The cast inclined plane is used to bring forward either an upper central or an upper lateral tooth which occludes inside of the lower teeth. Wax is shaped over the three lower teeth, in such a manner that a plane is formed which will just come to the lingual side of the offending tooth. This model is cast in any casting metal, and cemented to place.

This appliance keeps the bite open, and in a very short time forces the malposed tooth to place. When the tooth is in place, the casting is removed. No retaining appliance is necessary, as the bite will hold the tooth brought forward in place.

(2) By the use of the Van Horn method, using the standardizer, flask, and accessories, a wax pattern was expanded to the same size as the pattern was when in the mouth at normal body temperature.

The apparatus and each step of the technique was explained up to the drying out of the flask previous to casting. Full details of the technique and illustrations of the apparatus may be found in the Dental Cosmos for October 1911, page 1109, in an article by Dr. C. S. Van Horn, Bloomsburg, Pa.

Clinic on the Antrum of Highmore. (By E. B. Gleason, M.D., LL.D., Professor of Oral Surgery, Dental Department Medico-Chirurgical College, and Matthew H. Cryer, M.D., D.D.S., Professor Oral Surg. Dental Department, University of Pennsylvania.)

Dr. Gleason operated on a case of epulis, and then exhibited five cases of suppuration of the antrum of Highmore

or maxillary sinus. Of the five cases a cure had resulted in two, in one after a radical operation through the mouth—Caldwell-Luc operation—and in another after making a large opening from the antrum into the nose. He stated that mild catarrhal inflammation of the maxillary sinus, as the result of an ordinary cold or coryza, is much more common than is usually supposed, but that such cases generally recover spontaneously, or as the result of mild treatment, provided the ostium remains open. Some cases of chronic suppuration, however, result from la grippe, and some of these cases are pan-sinusitis, with the frontal sinus and ethmoid cells suppurating and discharging pus into the antrum through its ostium. Under such circumstances, it is sometimes necessary to destroy these cavities by a Kilian operation, and perhaps, later on, to do a Caldwell-Luc or Cryer operation, in order to bring about a cure, as in a case operated a short time ago.

A comparatively small percentage of cases of chronic suppuration of the maxillary sinus results from direct infection through gangrenous tooth pulps, which cases are generally seen by the dentist. The best treatment consists in the so-called Cowper operation, viz, the removal of the offending tooth and irrigation of the antrum through the socket of its palatal root, which is enlarged, if necessary, for this purpose. In some cases a prompt cure results.

Except when a gangrenous tooth pulp is manifestly the cause of suppuration, or when there is necrosis of the floor of the antrum, the Cowper operation is rarely justifiable. For diagnosis, an X ray gives valuable information as to the condition of all the accessory sinuses, and also of the condition of the roots of the teeth in relation to the antrum.

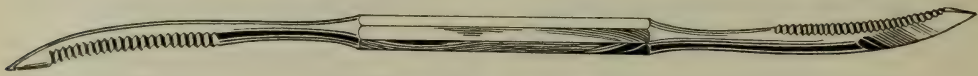
The clinician demonstrated how a positive diagnosis as to the presence of pus in the antrum is most readily made by puncturing the antrum through the nose with a Lichtwitz needle, which is not much larger than a hypodermic needle. Somewhat anterior to the middle of the suture between the inferior turbinate and the nasal wall of the antrum is the so-called "soft spot." This had been anesthetized by inserting a pledget of cotton saturated with 10 per cent. cocain solution beneath the inferior turbinate in the patient. The clinician thrust a hollow steel needle through the soft spot into the antrum without using force or apparently causing the patient any pain. A metal three-ounce syringe is connected by rubber tubing to the needle, and air is injected through the needle into the antrum, where it bubbles through the pus with a characteristic, audibly loud bubbling sound. At the present time, some of the fetid pus is blown into the nose through the ostium, and its fetid odor is apparent to those in the patient's immediate neighborhood. The three-ounce syringe is now filled with sterile, warm normal salt solution, and the sinus thoroughly cleansed—3, 6 or even 9 fluid-ounces of the normal salt solution may be used for this purpose.

For purposes of diagnosis, this method of cleansing the antrum is more reliable, and at the same time less expensive and repugnant to the patient than an X-ray negative. In acute cases, it generally gives immediate relief from pain, and a comparatively few daily irrigations with normal salt solution often bring about a cure. In chronic cases, like the one exhibited, it is desirable to make a large opening through the nasal wall of the sinus, which will secure continuous drainage.

For this purpose, the clinician has had constructed a double-ended trocar (see figure), of about the size of a No. 18 catheter of the French scale. One end is blunt, the other triangular, and very sharp. Both ends are slightly curved at the tip, and on the concave surface thus formed for the distance of $1\frac{3}{4}$ inch is a coarse file, so constructed as to cut only on pulling. The triangular end is placed as nearly on the needle puncture as possible, and the instrument gently rotated. As the bone is very thin, it readily cuts its way into the antrum. As the instrument is withdrawn, the file is pressed somewhat firmly against the anterior edge of the opening. The coarse file cuts away the soft, thin bone like a succession of knife blades, and

greatly enlarges the trocar puncture. The instrument is then reversed, inserting its probe point, and with the file as much of the nasal wall of the sinus is removed as is desired, without causing the patient any great degree of pain. In the case demonstrated, the operator made an oval opening rather larger than a ten-cent piece. An opening into the nose of this size will remain for a long time. It will afford constant drainage from the antrum and will not need to be closed with an obturator, as would be the case if the opening were made from the mouth. Should the opening tend to close before the surgeon desires, it is only necessary to insert the probe-pointed end of the clinician's instrument and scrape away granulations from the edge.

This method of treatment is sufficient except when the antrum is divided into two cavities by a high ridge extending transversely across its floor, or when the antrum contains polypi or necrotic bone. Even when the antral membrane is swollen to a quarter of an inch or more in thickness, it recovers under constant drainage and irrigations.



Gleason's antrum rasp.

The clinician showed one case that has been cured by this method. The opening has not yet closed, but there is no pus. The remaining three cases are still under treatment, which consists in daily cleansing with normal salt solution, and then injecting into the opening 95 per cent. alcohol, which is allowed to remain.

By this method of treatment, the fetid odor of pus generally disappears within a few days. The pus then, as it appears in the washing, instead of being diffused through the fluid, appears as one or more comparatively large masses of mucus, which is a sure sign that a complete cure may be expected soon.

In the case exhibited in which a Caldwell-Luc operation was done, a large opening was made through the mouth, the anterior bony wall of the antrum removed to the level of the infra-orbital canal, and the mucous membrane of the floor of the antrum was removed. A high, transverse ridge or septum, extending across the antrum, was curetted away. The bony nasal wall as high up as the insertion of the inferior turbinate was also removed, and its covering of nasal mucous membrane turned into the antrum to replace partly that removed from the floor of the antrum; the antrum was packed with iodoform gauze, part of which was removed in twenty-four hours, the rest on the second day. There was no elevation of temperature, and the ultimate result has been a cure, the antrum being somewhat reduced in size.

(The latter portion of the clinic was occupied by Dr. Cryer, who operated on a case of suppuration of the antrum according to his method.)

THE DENTAL COSMOS

A MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, APRIL 1914.

EDITORIAL DEPARTMENT.

A LOOK AHEAD.

MR. ANDREW CARNEGIE is credited with the authorship of this suggestive advice: "If you don't believe we have progressed, just look backward and see where we came from." When dentistry took on the insignia of professional organization seventy-five years ago, by the creation of the dental college, the calling together of the dental association, and the establishment of a periodical publication devoted to the dissemination of dental professional information, the foundations were laid of a movement which has transformed the care of the mouth and teeth from a mechanic art into a recognized department of the science and art of healing.

Before the period of professional organization, and for a long time thereafter, the ideals of dentistry in its educational work, its practice, and its literature were the ideals of the laboratory and the workshop. The terms "master" and "apprentice" epitomized the educational method. Prosthetic operations were "jobs," the

filling of cavities was "plugging," and, as late as 1850, "plugs" were inserted directly over exposed "nerves" in the hope that repair of the exposure would follow, and the necessity for "plugging the fang" would thus be avoided. Moreover, where a "plug" of amalgam had been inserted over an exposed "nerve," and the inevitable sequelæ of acute inflammation had ensued, the result was attributed to the poisonous effects of the mercury in the amalgam by the enemies of the detested material, who lost no opportunity to execrate those who used the "nasty stuff."

Yes, we have progressed, undoubtedly, and we are not a little inclined to look down in a patronizing way from the heights of our twentieth-century wisdom upon the *naïveté* and ignorance of our professional ancestors of a half-century ago, and to regard the period of their activities as a transitional stage—a sort of stepping-stone to the more rational and enlightened period of the present.

But history records nothing with greater emphasis than the fact that every period is transitional, developmental, progressive; hence it is certain that our successors will have equal, perhaps greater, reason to regard our present achievement as faulty and as clearly marked by ignorance of the truth as we now consider much of the achievement of our professional forebears to be. Each age expands and refines upon the experience of its predecessors. It is this inheritance of knowledge that accelerates our rate of progress, enables us to achieve our results more rapidly and with less labor, because we are, to a degree, in possession of principles that guide us in our work—principles that could not have been discovered without the pioneer work of the earlier periods.

The ideals of dentistry have therefore undergone fundamental alteration, and the shift has been from the mechanical and constructive to the therapeutic and biological. What has brought about the change? There can be but one answer, and that is the record of failure of mechanical procedures *per se* to successfully deal in a therapeutic way with dental disease and its sequelæ. That dental caries, for example, can be cured by mechanically stopping a cavity involves a question which can only be answered by taking into consideration our various conceptions of the meaning of the term "cure." In its broader sense the cure of dental caries is not to be defined or limited by the operation of restoring the lost portions of a tooth by a filling, but must include the elimination

of the conditions that make the destructive process possible. And in the same sense must the therapeutic features of all mechanical restorative procedures in dentistry be regarded. As a matter of fact, it is this change of mental attitude in regard to the relative importance of the mechanic art of dentistry and the living base to which it is adapted that is at the foundation of the present widespread interest in scientific investigation of the biological problems of dentistry. The time has definitely passed when human teeth can be regarded as inert matter, to be dealt with as such material is treated from a purely mechanical point of view. Every one of our operations is undergoing critical revision in the light of the possible vital reactions it may involve or induce.

Coincident with this general focusing of attention upon the vital aspect of our work, there is a constantly developing field of much intrinsic importance in its health relations—a field which is a kind of middle ground between medicine and dentistry, which is not definitely occupied by either profession for the simple reason that neither is at present educationally equipped to justify a claim to it. The constitutional relationships of the tissues and organs of the oral cavity are becoming more and more clearly defined; a few specialists by independent individual study have equipped themselves to deal intelligently and skilfully with certain phases of the subject, but no organized systematic plan has as yet been promulgated whereby practitioners competent to deal with the health problems related to this middle ground between dentistry and general medicine can be made educationally fit for the work.

The orthodontist, for example, has his own views regarding the relationship of tonsillar and adenoid hypertrophy to certain types of malocclusion. The laryngologist, on the other hand, has perhaps a different viewpoint and opinion upon the same question. Similar differences exist as to the etiology of sinusitis, pyorrhea alveolaris, reflex dental neuroses, general nutritional problems in relation to dental and oral lesions, and the pathogeny of many other conditions in relation to constitutional states. That the effective treatment of these conditions depends upon a sound knowledge of their etiology, pathology, and therapeutics is self-evident. No provision for such training in a broad and comprehensive way is provided by either the medical or the dental

curriculum, while the need for such systematic training is self-evident and the demand for it is developing with increasing insistence. It would manifestly be wasteful of time and energy to demand that a student in preparation for the field of activity here under consideration should pursue the medical course and the dental course, and thereafter follow a special course of indefinite duration in order to fit himself for intelligent practice. It remains, then, to determine whether the medical or the dental curriculum shall be expanded to include the requisite instruction and training. As medicine is even now overwhelmed in its educational activities by its inability to furnish a comprehensive professional educational training within the time limits of its present curriculum, and as the topics herein referred to are distinctly specialized by reason of their mouth relationships, it is clear that the reorganization and expansion of the dental curriculum to include the necessary additional instruction presents the only logical plan for the solution of the problem.

We fully anticipate that in due course of time we shall receive numerous criticisms from readers of this article who will have jumped to the conclusion that it is a diatribe directed against dental mechanics and dental mechanism. Those who may so view it will have failed to grasp its purport, and for their benefit let us add that it is a specific plea for the intelligent recognition of the character and functions of the vital base to which dental mechanics is applied, and a sympathetic recognition of the fact that all dental mechanical procedures whatsoever must be undertaken and applied in full recognition of the fact that the vital substratum has inherent and inalienable rights that cannot be ignored without protest expressed in terms of disease.

Correction. Dr. G. V. I. BROWN supplies a correction, indicated below by brackets, in the report of his remarks following the discussion of his paper read before the Dental Society of the State of New York and published in the DENTAL COSMOS for February—see page 219: "We did separate the median palatine suture of a skull supplied by Dr. L. W. Dean of Iowa City, from the anatomical room of the University of Iowa, by the use of an expansion appliance exerting pressure across the palate, [. This was shown] at a meeting of the Section on Stomatology of the American Medical Association at its last Chicago meeting, and this skull was examined by all who cared to do so."—ED. COSMOS.

Bibliographical.

The American Text-book of Prosthetic Dentistry. In Contributions by Eminent Authorities. Edited by Chas. R. Turner, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy, Department of Dentistry, University of Pennsylvania. New (Fourth) Edition, thoroughly revised and rewritten; 8vo, pp. 856, with 900 engravings. Cloth, $6.00 net. Philadelphia and New York: Lea & Febiger, 1913.

The present fourth, revised and enlarged edition of this standard text-book, which represents a most happy medium between the brief handbook and the exhaustive work of reference, embodies all the laudable features which have been pointed out in the review of the third edition published in Dental Cosmos, April 1907, page 408, plus many new features, chief of which are the condensation of subject matter not new to the prosthetist and the addition of chapters on anatomical articulation by the editor himself. Strange to say, the progress made in prosthetic dentistry since the appearance of the last edition is almost entirely confined to this phase, which the editor frankly characterizes as an intermediate step, not as the "ultima Thule," though great general improvement has been made in the scientific accuracy of our knowledge of this vital question, chiefly owing to the efforts of Gysi and Christensen. A commendable conservatism is displayed throughout the book, notably in the chapter on "Cast Metal Dentures," written by the late Dr. Clark L. Goddard, though the editor's skepticism in regard to base-plates of precious metals cast under pressure is not shared by a great many prosthetic dentists. In this field, no doubt, we shall see in years to come a change in methods to what will be simpler in execution and less liable to lead to inaccuracies and disappointments.

The omission of the technical details of metallurgical operations as regards obtaining the metals from their ores and all others not directly related to the practice of prosthesis in the laboratory is decidedly welcome, as they tended to increase the bulk of the book, but not its lucidity or practical conciseness.

The chapters on "The Examination, Preparation, and Study of the Mouth Preliminary to the Insertion of Artificial Teeth," "Impressions of the Mouth," and "The Making of Plaster Casts" have been written anew by Dr. A. DeWitt Gritman, and those on "Artificial Crowns" and "Bridge Work" originally written by Dr. Henry H. Burchard, and on "The Dental Laboratory: Its Equipment and Arrangement," "Porcelain Teeth," and "Hygienic Relations and Care of Artificial Dentures," by Dr. Chas. J. Essig, have been thoroughly revised by the editor.

Inasmuch as the construction of obturators and artificial vela has received such careful and thorough consideration, there is no reason why the prosthesis of the jaws of the face, the so-called *prothèse immédiate,* should be left out

of consideration entirely. Such a chapter would undoubtedly mark a welcome addition to American dental literature. More space might also be devoted to the prosthetic treatment of fractures.

These few suggestions are not meant in any way to detract from the wonderful completeness of this excellent work, in which the knowledge and skill of the foremost prosthetists are embodied. The illustrative material and the technical execution of the volume are again of the highest order.

ANATOMY, DESCRIPTIVE AND APPLIED. By HENRY GRAY, F.R.S., Fellow Royal Coll. of Surgeons; lecturer on Anatomy at St. George's Hospital Medical School, London.

New American Edition.

Thoroughly revised and re-edited, WITH THE ORDINARY TERMINOLOGY FOLLOWED BY THE BASLE ANATOMICAL NOMENCLATURE, by EDWARD ANTHONY SPITZKA, M.D., Director Daniel Baugh Inst. of Anatomy and Prof. Gen. Anatomy, Jefferson Med. College of Philadelphia. Imp. 8vo, pp. 1502, with 1225 elaborate engravings. Cloth $6.00 net; leather, $7.00 net. Philadelphia and New York: Lea & Febiger, 1913.

New English Edition.

From the Eighteenth English Edition, thoroughly revised and re-edited, with the Basle Anatomical Nomenclature in English, by ROBERT HOWDEN, M.A., M.B., C.M., Professor of Anatomy in the University of Durham, Eng. Illustrated with 1126 engravings. Imp. 8vo, pp. 1407. 1913.

Gray's Anatomy hardly needs mention or comment, for, as the American editor puts it modestly, "as a thoroughly practical treatise on the subject for the medical student, both in the original and its many succeeding editions, it has long been held in the highest esteem." The plan of presentation of this really overwhelmingly broad subject that has been followed in former editions by Dr. Spitzka has been adhered to in the present new edition, though a plentiful supply of new material representing the latest views and most recently discovered facts has been incorporated. Any prolixity in description has been strictly pruned, and care has been taken to avoid any obscurity in complicated details. Many important medical and surgical items have been added under the heading of Applied Anatomy, and a liberal number of new illustrations from original drawings and preparations, and some from standard works, have been incorporated. All these and the many other excellent features through which Gray has for over fifty years stood as the unrivaled archetype, distinctly characterize its latest presentation.

The only feature which in our opinion permits of argument is the terminology employed by the editor, of which he says that, owing to the widely different opinions which prevail concerning the use of descriptive terms, he has sought to take a middle course, employing such designations as seem sanctioned by their usage in current medical literature. The *Basle Nomina Anatomica* nomenclature has been added in italics and in parentheses, except where the two nomenclatures are identical—so that either or both may be used with facility, and the terms of both nomenclatures are listed in the admirably complete general index. This arrangement is simply a compromise, and one that is perhaps open to objection, because as long as the decisions of the international Basle Commission on Nomenclature have been universally

accepted they might as well be adopted —if the labors of that commission are not to be entirely lost. In a science as old as anatomy it is difficult, of course, to run counter to the terms that are in common use in a given country; but every reader of foreign scientific literature that comprises anatomy knows how annoying and time-wasting are the differences in anatomical nomenclature as exhibited in different languages. In dental literature, especially, this discrepancy is a fruitful source of obscurities and misunderstandings. The Latin in the Basle nomenclature surely is no drawback, unless one be so much of a modernist as to deny the great importance of a classical education for a future professional man. Since the majority of the medical man's vocabulary is composed of technical terms of Latin or Greek origin, plus a German, English, French, Spanish or Italian ending, we can see no reason why the requirements as to knowledge of Latin and Greek for matriculants in medical schools should not be raised to the same high standard which is adhered to in Germany, for instance. This would not only tend to internationalizing the Basle standard and the entire scientific vocabulary of medicine and dentistry alike, but would at the same time do away with the many atrocities committed by medical and dental men against the classic languages, which are painful and gruesome to behold.

The English edition, too, has its struggles with this problem, and meets it in the following manner: "Except in a few instances, the Basle nomenclature has been adopted in its entirety; in most cases English translations of the Latin terms are employed, but in those cases where the Latin terms have become fixed by routine usage, it has been deemed desirable to retain them. Where the Basle nomenclature differs materially from the older terminology, the latter has been added in brackets, and for further convenience a glossary is appended showing (*a*) the terms adopted in the text, (*b*) the Basle, and (*c*) the old terminology." This is surely a compromise which does not tend to bring uniformity in anatomical nomenclature; moreover, the appended glossary is a waste of space. From the American, this English edition differs in that the paragraphs on Surface Anatomy, which in the former are appended separately to the descriptions of the various structures, are collected and presented in a special chapter, which admits of more easy reference. The same is true of the section on Histology, in which the elementary tissues are described, while the complex tissues are considered along with the organs to which they are specially related—the argument that these items are best understood in immediate connection with the individual tissues and organs being a very plausible one. The sub-headings in many chapters are arranged differently from the American edition, and, true to English conservatism, the older anatomic terms have here been retained.

In regard to illustrative material, honors are almost evenly divided between the two editions, with a slight shade in favor of the American work, as containing more up-to-date and clearer drawings, with better coloring.

The flagrant misprint on the title-page of the English edition, which reads, "A New American from the Eighteenth English Edition" (which we have corrected in quoting the title at the head of this review) is an unfortunate slip.

Both editions embody the most advanced knowledge of anatomy in the English-speaking countries, and the painstaking work of the editors, both of whom enjoy a world-wide reputation as anatomists, is nothing short of stupendous. The publishers have again lavished all possible means to make these two volumes worthy of the inherited enviable reputation of their many predecessors.

R. H. R.

PAMPHLETS RECEIVED.

"Ueber 'Solila-Zähne.'" (On Solila Teeth.) By Zahnarzt Knoche, Gotha. Reprinted from *Zahnärztliche Orthopädie und Prothese*, 1913.

"Studies of Syphilis." By Chas. F. Craig and H. J. Nichols, U. S. army. War department: Office of the Surgeon-general. Bulletin No. 3, June 1913.

"X-ray Studies of the Ileo-cecal Region and the Appendix." By J. T. Case, M.D. Reprinted from *American Quarterly of Roentgenology*, November 1912.

"Surgery of the Ileo-cecal Valve." By J. H. Kellogg, M.D. Reprinted from *Surgery, Gynecology, and Obstetrics*, Chicago, November 1913.

"Incompetency of the Ileo-cecal Valve. Disorders Arising from This Condition, and Their Treatment." By J. H. Kellogg, M.D. Reprinted from *Medical Record*, June 21, 1913.

"A Clean Mouth, and Ten Reasons for Keeping It Clean." Published by the Rochester Dental Society.

"The Care of the Teeth, Together with Diseases of the Teeth and Tuberculosis." Published under the auspices of the New Zealand Dental Association and the British Medical Association.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Lancet*, London, December 6, 1913.]

DENTAL CARIES AS A CONTAGIOUS DISEASE. (Editorial.)

The following editorial comment, appearing in the columns of one of the foremost medical journals, is symptomatic of the general interest which is coming to be displayed in matters of oral disease by general medicine.

Under the title of "The Conquest of Caries" there appears in the *British Dental Journal* of November 15th an article in which the author, Mr. William H. Jones, gives an interesting account of the progress of the dental school clinic established at Cambridge. The figures given by Mr. Jones indicate that there is a definite improvement in the general condition of the children from a dental point of view. It is, however, a curious fact that nowhere in the report is there any reference to the relation of nasal obstruction to the amount of caries or the general condition of the mouth. Again, there are no very accurate figures on the percentage of children showing a marginal gingivitis—figures which one naturally expects to find in any statistics of school clinics where the recent authoritative teachings of dental surgery have been assimilated. In the paper there is a statement that dental caries is a contagious disease. Much caries has been shown to be a disease due to the stagnation of carbohydrate food about the teeth, the fermentation of the stagnant carbohydrates resulting in the formation of lactic acid. In the various investigations made by trustworthy observers there has been little or nothing brought to light supporting the theory of contagion. The author's conclusions are apparently based on the following observa-

tions: (1) That in the new patients examined there is a lessened incidence of caries. (2) That these new patients are in the majority of cases the younger brothers and sisters of children who have been treated in previous years. "They consequently live in homes and work in schools where the amount of oral sepsis has been enormously lessened in the last five years. In consequence, these younger children breathe a better atmosphere, probably more especially when asleep, and they eat off plates and drink from vessels less liable to be contaminated, and are consequently less liable to be influenced adversely by any infantile contagions." (3) The minimum amount of treatment prevents advance of caries in a given mouth. (4) "The decay in the deciduous second molars appears to be responsible for much of the decay in the permanent first molars, so much so that the extraction of a decayed deciduous second molar is frequently performed as a conservative act in connection with the scheme." Mr. Jones then says that—"If it be admitted that decay can spread from tooth to tooth in a mouth, or be prevented from doing so, then it appears reasonable that decay may also spread from the teeth of one individual to those of another." An axiom in the prevention of caries is that the mouth must be functional, and to be functional the teeth must be free from tenderness so as to allow mastication without pain, and there must be nasal breathing. The absence of either of these conditions results in the formation of stagnation areas and liability to caries, if the food lodging around the teeth be a carbohydrate. Consider the author's observations by the light of the functional mouth, and what do we find? To take the last observation first, a carious deciduous second molar, being a functionless tooth, will lead to the formation of stagnation areas in its immediate neighborhood and also around the opposing teeth. The permanent first molar is approximal to the deciduous second molar, hence this tooth is involved, and if the carbohydrate food is present in the stagnation areas, caries follows. If we remove the carious, tender, deciduous molar, functional activity is restored, and food does not lodge. Take the observation that the minimum amount of treatment prevents the advance of caries—this is due, again, to the removal of tender areas of mastication, restoring functional activity. The observation of the decrease of caries in families is far more rationally explained on the lines of increased attention to dental hygiene. If due to the lessening of contagion, one would expect it to be general throughout the family, but it is the common experience of practitioners to find one child more affected with caries than another, and inquiry soon elicits the fact that oral hygiene or neglect of the rules of dietary is the cause. The verdict to be passed on the author's assertions is certainly "not proved," and, taking all the facts that are known relating to caries, we are inclined to consider it should be "not likely." The plan for the conquest of caries does not lie in approaching the disease as one due to contagion, but rather as one due to stagnation of carbohydrates. Preventive treatment along the latter lines has led to most hopeful results.

[*Dental Review*, Chicago, February 1914.]

ANKYLOSIS OF THE MANDIBLE. By Dr. V. P. Blair, St. Louis, Mo.

The writer's observations convince him that practically all cases of ankylosis can be permanently relieved. The ages vary, his youngest operated case having been five years of age, the oldest case treated sixty.

In nearly fifty per cent. of all reported cases, the most common cause was trauma by a blow or fall on the chin; next to injury comes scarlatina, accounting for one-fifth of all cases. From the reported cases, bony ankylosis would be inferred as the cause in the majority of the cases, but the writer's cases were mostly fibro-osseous.

The development of the ankylosis has in his cases been gradual. Following the injury or arthritis, the opening became gradually limited, and decreased until there was complete or almost complete closure. The results of forceful dilation were only temporary. The chief symptom was inability freely to open the mouth, which latter was apt to be foul, masses of tartar covering the molars. In a somewhat close unilateral fibrous ankylosis, as the mouth opens, the chin deviates to the ankylosed side.

The writer distinguishes between cases where the joint is affected directly and those in which the limitation is due to binding

scars in the cheek, though an Esmarch operation is designed to relieve both conditions.

Simple division or excision of the cheek bands has not been efficacious; the bands soon united again or new scar formed. For the permanent correction of scar bands in the cheek, it is most reasonable to excise these bands, and replace them with epithelial tissue.

Where the mucous lining of the mouth was deficient, Blair has, with satisfactory results, transplanted a skin flap from the neck, left attached by a pedicle, and brought into the mouth through an incision in the lower fornix of the cheek. The flap was sutured in place, and about two weeks later the pedicle was cut, and the defect in the neck repaired.

For ankylosis directly affecting the joint, an excision of the joint or the removal of a section from the body of the ramus is necessary. A considerable piece must be removed or some material—Blair used subcutaneous temporal fascia—must be interposed to prevent the cut ends reuniting.

His incision, differing from those presented elsewhere, has the advantage of being within the hair and allows the making of a suitable flap of fat tissue for the construction of the new joint. A skin flap, with very little subcutaneous tissue, is turned downward and forward. A similar flap is made of subcutaneous tissue down to the temporal fascia, the parotid gland, containing the branches of the seventh nerve, and the masseter muscle, are stripped downward *en masse*, and the condyle, coronoid process, and upper part of the ramus are removed. The fat flap is sutured to the now exposed internal pterygoid muscle, so that it rests between the cut portions of bone. Though it causes the patient some discomfort, he prefers to have the mouth dressed thus for one week.

The author himself has treated fourteen cases and knows of one hundred and ninety-four that have been reported in the literature.

[*L'Odontologie*, Paris, October 30, 1913.]

FUSION OF THREE MOLARS BY EXOSTOSIS. By L. Guillot, Paris.

Guillot reports a case of fusion of three upper molars by exostosis of the cementum, as follows: The patient, a workman of thirty-seven years and of excellent health, presented for the extraction of the upper right first molar, which exhibited symptoms of severe pericementitis and deeply penetrating caries. He related that previous attempts at extracting some of his anterior teeth had invariably failed, the teeth being broken off. The teeth in the upper molar region showed no abnormal symptoms except the ones described, the second and third molars being apparently normal in size and shape. When the upper right molar forceps were applied to the first molar, the operator was surprised to see the second and third upper molars easily coming away with the first. Healing took place rapidly. While the fusion of the first with the second molar can be explained by irritation from pulpal infection of the first molar, that of the second with the third is not so easily explained, as the condition of these two teeth was not such as to cause any irritation of the cementum.

The writer unfortunately fails to report whether he has taken a radiograph of the mouth of this patient, which might have revealed similar exostoses in other teeth and explained the former futile efforts at extraction.

[*New York Medical Journal*, New York, October 18, 1913.]

THE TEETH AND THEIR RELATION TO THE EYE. By Dr. A. M. MacWhinnie, Seattle, Wash.

[*Ophthalmic Record*, Chicago, November 1913.]

ORBITAL AND OCULAR NEURALGIA DUE TO DENTAL IRRITATION. By Dr. H. V. Wuerdemann.

The exact relationship that accounts for the many eye changes seen are often due to obscure conditions of the teeth, the intervening or carrying tissue not apparently suffering in the least. It appears that it is the terminal filaments of nerves or lymphatics that are the carriers, and the lowered resistance at their terminals are occasions for this disturbance. Several cases have been reported by Rogers where, in filling a tooth, a broach was left in the root-canal, causing hemorrhages of the eye. Temporary blindness has been reported by others. (See also

"Connection Between Ocular Diseases and Inflammatory Conditions of the Teeth," by Dr. F. Seydel, DENTAL COSMOS, January 1913, p. 106; "Relations Existing Between Teeth and Eyes," by Dr. W. E. Bruner, and "Metastatic Ophthalmia Following Tooth Extraction," by Dr. Dimmer, DENTAL COSMOS, September 1913, p. 959.)

The writer cites two cases from his own practice, in one of which there was a great amount of fatigue, the patient not being able to use his eyes over ten minutes at a time. The teeth were apparently all sound, and it was only after an X ray had been taken, disclosing an abscess at the root of the upper left canine, that the obscure etiology of this most puzzling case was revealed. About 1.5 cc. of very fetid pus was drained from an opening made above the tooth, whereupon immediate improvement in eyesight was noted. The time elapsed from the opening of the abscess cavity to the patient's last presentation was three and one-half years, the eyesight continuing to be normal.

Another case, in which all efforts of correction of the eyesight were futile, did not improve until dental examination and treatment was instituted. Transillumination showing a dark area over the right maxillary antrum extending to the ethmoid, the upper first molar was extracted, and an opening made into the antrum, resulting in the discharge of a considerable amount of purulent matter. Irrigations were daily used, but the patient had no relief from pain. At the end of the fifth day the lower first molar was extracted, and inside of an hour there was a complete cessation of all pain, with the return of the vision to the former condition. Examination of the lower first molar showed an abscess at its root, which evidently was the cause of the excruciating neuralgia extending from the superior maxillary bone to the right eye and ear.

The cases reported show how valuable dental examination may prove, no matter whether cavities are present or not, in all obscure eye troubles.

Wuerdemann also reports a case in which the patient complained of severe pain back of the eye, the vision of which was slightly affected, with slight contraction of the visual field and marked congestion of the papilla. Examination revealed an upper left second molar with a gold shell crown, which was sensitive and had been recapped several times by different dentists during the previous year. Extraction of the tooth was advised and performed, when a dental broach was found extruding from the lingual root about one-sixteenth of an inch. The pain back of the eye was completely relieved, the vision improved to normal, the blurring disappeared, and the visual field was nearly normal two days after the extraction of the tooth.

[*L'Odontologie*, Paris, August 15, 1913.]

RADIUM AND ITS THERAPEUTIC APPLICATIONS. BY DR. A. JABOIN.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, November 1 and 29, 1913, and February 14, 1914.]

CONTRIBUTION TO THE TREATMENT OF PYORRHEA ALVEOLARIS BY MEANS OF RADIUM. BY ZAHNARZT R. EISEN, BERLIN.

THE VALUE OF HIGH EMANATION DOSES IN THE TREATMENT OF PYORRHEA ALVEOLARIS BY RADIUM. BY M. LEVY, BERLIN.

CRITIQUE OF RADIUM THERAPY. THE PURCHASE OF RADIUM AND MESOTHORIUM. BY ZAHNARZT WEIDNER, COLOGNE.

HIGH OR LOW DOSAGE IN RADIUM THERAPY? BY ZAHNARZT R. EISEN, BERLIN.

[*La Stomatologia*, Milan, December 1913.]

RADIUM THERAPY IN ORAL DISEASE. BY PROF. DR. LUIGI ARNONE.

[*Zeitschrift fuer Physikalische und Dietetische Therapie*, Berlin, May 1, 1912.]

TREATMENT OF NEURALGIA WITH RADIUM. BY B. BUXBAUM.

[*British Medical Journal*, London, February 4, 1913.]

THE RADIUM INSTITUTE'S FIRST REPORT. BY A. E. HAWARD, F.R.C.S.ENG.

The French article of Dr. Jaboin offers an interesting review of the history of the discovery of radium, and the various therapeutic uses to which this newly discovered element has been put. Jaboin discusses especially the pharmacology of radium, and its employment by ingestion, injection, ionization, and

admixture to various drugs, potions, and mud.

Eisex, who publishes several lengthy reports of radium treatment in pyorrhea alveolaris, condemns the employment of weak emanations, viz, 300 units per liter or 1000 units per liter, as recommended by Trauner and Levy respectively, the success of which he ascribes to good luck and careful removal of calculus. Stronger solutions, of from 5000 to 20,000 units per liter, produce a noticeable effect, especially if introduced into the pus pockets. In advanced cases, however, even emanations of this strength are not of sufficient power. Refractory cases which did not react to emanation therapy invariably improved upon radiation with three miligrams of radium bromid; improvement, however, does not set in until three or four weeks following the radiation treatment. The action of radium emanation in the mouth is due to the bactericidal property of the alpha-rays, which affect various micro-organisms in a very different way, some being extremely sensitive, others extremely resistant. The effect of radium radiation in advanced pyorrhea is due to the beta-rays, perhaps also the gamma-rays, the alpha-rays being eliminated by the double glass cover of the preparation. The etiology of pyorrhea varying in individual cases, discrimination and individualization in treatment is imperative. Failures are due, according to Eisex, to excessively weak dosage. Care is advisable in the purchase of radium preparations, as not all firms market reliable products. Eisex appeals to the medical profession to examine their patients' mouths, if ever so superficially, in order to avoid the progress of pyorrhea to a hopeless stage.

Levy defends his method of radium therapy, which has been reviewed in the DENTAL COSMOS for November 1913, p. 1192, but warns against any final verdict in regard to the efficacy and lasting character of this new therapeutic method. Eisex replies to Levy in a rather irritated manner, emphasizing, among other things, the necessity of keeping radium therapy at a price within the reach of all.

The purchases of or orders for radium by various German municipalities have brought up the question of the advisability of such an investment in other cities. Weidner advises caution, until the first rush, which in America has reached the proportions of an hysteria, is over, and the results or claims for results have crystallized into more tangible form. Despite the uncritical and hyper-enthusiastic trumpet-blasts of the lay press, scientific authorities are by no means in accord in regard to the successes of radium treatment, which, as Weidner shows by citing many weighty reports, is still in an experimental stage, the comparative therapeutic values even of radium and mesothorium not having been definitely decided upon.

Arnone reports the disappearance of a refractory tumor in the hard palate after seven radiation treatments with one centigram of radium for from ten to twenty minutes each at intervals of three days.

The hyperemic and analgesic action of radium was early employed in the treatment of neuralgia, with good results. Buxbaum employs radiol-gelatin and compresses of radioactive preparations, which can be used for months. He also recommends so-called Joachimsthal bags containing pitchblende residues, which the Joachimsthal miners have been using for ages as a home remedy. The writer applies the compresses, containing barium and radium sulfates, as well as the radiol-gelatin, for from six to twelve hours, protecting the skin by an interposed layer of woolen cloth in order to moderate the influence of the X rays, which cause dermatitis. The deeper the action desired, the longer the exposure must be, though the danger from excessively long exposure must always be realized. The interposition of stronger filters will partly eliminate the beta and X rays. Buxbaum reports cures or decided improvement following radium treatment—in one case of violent neuralgia of the second branch of the trigeminus in a woman of fifty-two years, in trigeminal neuralgia in a man of sixty-one years, in neuralgia of the second and third branches, and in a number of cases of sciatica. The treatment failed entirely, however, in a case of neuralgia of the second and third branches of the trigeminus, and in one case of sciatica.

Much of very great interest from the dental point of view is contained in the report of the work carried out at the London Radium Institute from August 14, 1911, to December 31, 1912, by E. H. Pinch, medical

superintendent of that institute. In regard to epithelioma in relation with mucous membranes, it is pointed out that epitheliomata of the tongue, buccal, gingival, and pharyngeal mucous membranes are almost uniformly disappointing in their ultimate response to radium therapy. Temporary improvement is not infrequently seen, and this sometimes goes as far as disappearance of the original lesion; but the treatment has practically no effect in preventing or delaying the appearance of metastatic deposits in cervical glands and elsewhere. The rate of growth of the infected glands can often be retarded by the prolonged and persistent use of the "ultra-penetrating" rays. If the dose given be a large one, the glands sometimes break down and discharge a milky-white fluid through a small sinus, and it is remarkable that ulceration of glands thus treated rarely occurs.

Considerable difficulty is experienced in giving satisfactory exposures within the oral cavity, as patients are often unable to tolerate the presence of applicators in their mouths for the necessary length of time, and should the reaction be at all pronounced, the congestion of the tissues occasions great discomfort. There is the further danger that a severe reaction may act as a stimulus to the original growth, increase its size, and hasten metastasis. The appended report of cases of epithelioma is not very encouraging, while in the cases of sarcoma of the maxillæ, and the pharynx, and of parotid tumor, the radium therapy appears to have been most beneficent.

[*Deutsche Monatsschrift fuer Zahnheilkunde*, Berlin, November 1913.]

NORMAL AND PATHOLOGICAL CIRCULATION IN THE MAXILLÆ AND DENTAL TISSUES. BY DR. RICHARD LANDSBERGER, BERLIN.

The writer's deductions are based on the causes of destruction of the pulp, which may be as follows: First, the pulp may die owing to deeply penetrating caries; second, devitalization may become necessary in order to preserve the tooth by a filling; third, the introduction of a pivot in a root-canal for the retention of a bridge may necessitate pulp devitalization; fourth, the pulp may die under an excessively large filling; fifth, devitalization may become necessary for therapeutic reasons in cases in which, owing to constitutional disease, the bloodvessels in the pericementum are obliterated. The teeth then become loose, and symptoms of pyorrhea alveolaris appear. All these symptoms disappear upon pulp devitalization, the teeth becoming firm in their alveoli and the formation of pus ceasing. This may be explained by proliferation of the bloodvessels in the pericementum taking place following devitalization; the blood then circulates more vigorously, and the nutrition of the pericementum is improved. Every active or arterial congestion in the body, as produced by sudden increase in heart action, cold extremities, or high altitude, or any passive congestion as produced by decreased heart action, constipation, exudations or tumors, amputation of one of the extremities, extirpation of the uterus, cessation of menstrual functions, pregnancy, or menstruation, may be reflected in devitalized teeth in the form of a local hyperemia which may cause odontalgia, swelling or bleeding of the gingivæ. While, in consideration of these possible sequelæ, death of the pulp is to be avoided, devitalization may become imperative in pyorrhea alveolaris, loosening of the teeth, and wasting of the alveolar process, for the reasons stated above.

Therapeutic treatment is based upon the described proliferation of the bloodvessels, and consists in deviating the blood from the jaws and teeth. Locally, this is attained by repeated scarification of the gingivæ, application of a Priessnitz cold-water dressing upon the aching side of the jaw, and painting the gingivæ with iodin. Peripherally, the blood may be deviated from the jaw by hot hand or foot baths, to which, if deemed necessary, mustard may be added. In complications, especially preceding menstruation, blood-letting will successfully counteract the hyperemic symptoms in the mouth. Internally aspirin has been found valuable. Extraction is advisable only as an extreme measure, after all the previously described measures have failed. If, however, a temporary hyperemia becomes associated with an infectious inflammation of the pericementum, extraction is indicated, provided resection of the root is not feasible.

PERISCOPE.

Gathering Wax into Sheet Form.—A doubly thick piece of window glass, four by twelve inches in size, is dipped into cold water, then into the melted wax. The resulting sheets of wax easily come off the glass.—G. A. BOWMAN, *Dental Brief.*

Hints on Melting Zinc.—Repeated fusing will render zinc very slow in melting, and when it is in this condition it contains much dross. The dross can be removed by using a little sal ammoniac, and the melting can be improved by adding a pinch of aluminum to the zinc.—*Ash's Canadian Monthly Circular.*

Increasing Natural Appearance in Full Dentures.—In setting up full dentures, a more natural effect is obtained by substituting canines of a slightly darker shade than those of the set. This suggestion applies especially when the lighter shades of teeth are employed.—W. S. HINDER, *Commonwealth Dental Review.*

Preparing Roots for Post Crowns.—When preparing a root for a crown post, it is a wise precaution to countersink slightly the first third of the canal with an inverted cone bur. This gives increased anchorage to the post. The undercut should not be deep enough to weaken the root. Crown posts seldom come out when an undercut is made in the canal before setting.—S. BRADDOCK, *Commonwealth Dental Review.*

Aluminum Forceps for Handling Iodin.—Now that iodin tincture is so widely used as a surgical disinfectant, the inconvenience caused by the action of iodin on the metals of ordinary forceps and other instruments may give rise to no little inconvenience. To obviate this the German firm B. Schaedel have patented a small aluminum forceps for use with iodin swabs. Apart from the fact that aluminum is quite unaffected by iodin, the lightness of the metal and the fact that it remains untarnished in the atmosphere of the ward or laboratory render it an ideal material for instruments of this nature.—*Vierteljahrsschr. f. prakt. Pharm.*, per *British Dental Journal.*

Enlarging and Measuring Root-canals.—If the enlarging of root-canals has been decided upon, the process may be carried out by opening up the mouth of the canal with a special drill, measuring its length with a fine smooth broach supplied with a small movable rubber disk for the purpose, and then carefully and without force using drills of various sizes, such as Beutelrock's, frequently removing them to free the débris, and noting particularly the length of the canal on the drill, while operating, by means of the movable rubber disk.—T. W. WIDDOWSON, *Brit. Journ. of Dental Science.*

Soldering Backings to Platinum-pin Teeth.—Much trouble is sometimes caused through carelessness in backing teeth with gold or other metal. To avoid it, the case, after having been waxed up, invested, and scalded out, should be placed on an asbestos or fireclay slab and slightly heated up until all the moisture has been driven off. The blow-pipe flame should then be applied to the case, and finally directed upon the solder. If the case is allowed to remain upon the Bunsen burner beyond the drying-off stage, rapid and excessive oxidation takes place, which is likely to affect the platinum pins, rendering them brittle and very liable to fracture.—*Ash's Monthly.*

Dental Clinics in Japan.—It is noteworthy that in Japan all polyclinics have a dental department where operative and prosthetic treatment is given free or at a very low cost. Consequently the common people frequently have gold fillings or artificial dentures. The general health of the nation is doubtlessly enhanced thereby. Japan is ahead of us in this respect, and it is high time to establish or to extend similar institutions in our country. The great extent of dental service in their country no doubt has brought it about that the Japanese enjoy an excellent reputation in this field all over Eastern Asia, and that even in non-Japanese communities, the Japanese dentist is frequently met beside the American.—E. STEINITZ, *Deutsche Med. Wochenschrift,* per *Correspondenz-blatt fuer Zahnaerzte.*

Solder Fluxes in Solution.—The solder fluxes in solution now on the market are a good substitute, if not an improvement, on the old-time borax plate, especially if soldering operations are not sufficiently numerous. It is a mistake, however, to put them up in long, slender bottles, which are easily overturned. It does not help one's temper or make easier the operation in hand when an accidental movement overturns the bottle and spills its contents. Fluxes should be put up in bottles shaped like the typical ink-bottle, short and with a wide base: such a bottle is not liable to overturn. A rod affixed to the cork or stopper, with which the flux can be applied is a very helpful accessory.—W. H. TRUEMAN, *Dental Brief.*

Files and Trimmers for Finishing Gold and Amalgam Fillings.—Plug-finishing files are valuable for filing off the extra bulk of gold or amalgam fillings when the surface to be trimmed is inaccessible to disks or stones. Only the finest-cut files should be used on the margins of the fillings, and then with the greatest care to prevent the tearing-off of gold or breaking the amalgam and enamel rods.

Gold trimmers for cutting the gold even with the margins of the cavity are the most valuable instruments in finishing gold fillings. The discoid excavator is very valuable for occlusal margins. These instruments should be kept perfectly sharp. They offer the advantage that a filling can be trimmed accurately and rapidly without injuring the filling or tooth structure; they can be used also on hardened amalgam fillings.—M. E. RICE, *Texas Dental Journal.*

Nitrous Oxid and Oxygen Anesthesia.—Short operations can be performed painlessly with nitrous oxid, alone or in combination with oxygen. With or without oxygen, it is also adapted for the beginning of chloroform-ether anesthesia. The anesthesia may be deepened by giving a sedative the evening before, and again just before the operation. This combination permits the use of this form of anesthesia in a much wider range of cases. Nitrous oxid and oxygen is the least objectionable form of general anesthesia for the patient. There is no feeling of suffocation and hardly ever any excitement or vomiting; it is the least dangerous to life of any anesthetic. If the anesthesia is not deep enough, chloroform or ether can be given at any time without injury to the patient.—E. ZWEIFEL, *Monatsschr. f. Geburtshülfe u. Gynäkologie*, per *Journ. Amer. Med. Association.*

Pulp Insulation and Pulp Capping.—The practice of leaving a mass of leathery, necrotic dentin over even healthy pulps is reprehensible. Dehydration and subsequent saturation with strong antiseptics may be regarded as futile. It is more scientific to secure immunity from recurrent invasion of micro-organisms by the complete removal of such tissue, even at the cost of devitalization. Experience compels us to dogmatize on certain points. No matter how shallow a cavity may be, no metal or phosphoric acid compound should be placed in direct contact with the dentin of a pulpal wall, excluding, of course, very small superficial cavities. The following paste, accurately placed and well tamped with successive hard-rolled pellets of bibulous paper, makes an ideal bactericidal intermediate, which possesses the great advantage of sealing the dentinal tubuli and preventing thermal shock: Creasote one drop, eugenol four drops, oxid of zinc, enough to make a stiff paste. Assuming a healthy pulp, perfect excavation, a high opsonic index, and strict asepsis, an extensive exposure may be safely capped with this preparation. For this purpose it should be mixed to a thinner consistence than for pulp insulation.—S. SHERRY, *Commonwealth Dental Review.*

Sponging to Prevent the Deglutition or Aspiration of Blood in Extraction.—Sponging is very often neglected by dentists. A surgeon requires all blood to be removed as fast as it comes when he operates, and no person can extract well, if the roots are hidden by blood. Plenty of sponges should therefore be provided. A few yards of cheesecloth may be cut into pieces of the size of a sheet of writing-paper or larger, and a nurse shown how to fold these sheets, which are either kept in a glass jar into which a few drops of formalin are poured now and then, or which may be sterilized by steam. These sponges, or two or three of them fastened together, may be placed in the fundus of the mouth to prevent blood or pieces of root from getting into the throat. They must be large enough so that they will not themselves get into the throat. If used in this way, they will aid anesthesia by preventing air entering the lungs via the mouth. Even a small amount of swallowed blood will almost always produce nausea, and blood-clots quickly form, which if drawn into the air-passages may prove dangerous. In extracting under nitrous oxid and oxygen anesthesia, therefore, it is advisable to keep the patient in an upright position.—H. B. CLARK, *Dominion Dental Journal.*

Indications for Tooth Extraction.—In the following cases the extraction of teeth is indicated: Teeth resisting medicinal or surgical treatment; teeth causing infection, where the septic focus must be removed hastily; teeth that have lost their function, viz, interfere with proper articulation, cannot be restored by fillings, inlays, or crowns, or interfere with the introduction of bridges or dentures; teeth which are impacted and are a source of trouble; supernumerary teeth; teeth which erupt before or shortly after birth; deciduous teeth which are retained beyond their proper time of exfoliation; single teeth in the upper jaw. Malposed teeth should never be extracted for the correction of a deformity unless an orthodontist has been consulted, even if the patient expresses such a desire. Broken-down deciduous teeth should not be extracted unless they are the seat of infection and beyond treatment. It is often advisable to retain deciduous roots in position until the permanent teeth are due to erupt, even if they cannot be filled properly. The fact must of course be borne in mind that such roots are not absorbed. Untimely removal of deciduous teeth results in many irregularities of the permanent set.—W. J. LEDERER, *Dental Digest.*

Eczema of the Lips Due to Salol in Dentifrices.—*The Perfumery and Essential Oil Record* makes reference to a case in France where a patient of an eminent French practitioner developed a species of eczema of the lips, consisting of a continual desquamation of the mucous surface, with roughness and granulation of the neighboring cutaneous tissue. The origin of the trouble was traced eventually to the use of a dentifrice which contained chalk, soap, salol, pumice, and essential oils. On discontinuing the use of this dentifrice, the evidence of skin trouble disappeared. Salol, in powders, lotions, pomades, etc., is held by some authorities to be responsible for numerous skin affections of an eczematous type, and in this particular instance it is stated that the soap, pumice, and salol had united to produce an artificial eczema of the lips.

Commenting on the case reported, the *Medical Press* states that the occurrence of an eczematous dermatitis around the mouth, consequent upon the use of certain dentifrices. particularly those containing salol, is well known to dermatologists. It is therefore wiser for the dentist not to recommend the use of dentifrices which contain salol or allied substances to patients with sensitive skins, even though the quantity present be apparently insignificant.—*Dental Record.*

Advantages of Anatomical Occlusion of Artificial Dentures.—The value of the system of occluding teeth anatomically as followed at the present time has been proved beyond question. In most cases patients for whom substitutes are constructed by this method are able to masticate efficiently on first trial, because by the very nature of their arrangement, the teeth glide in normal paths without interference, while the dentures as a whole sustain each other in normal position in masticatory effort, owing to the development of the balancing points of contact, which prevent the tipping of the dentures. While it is true that more time is required, and possibly greater care exercised in following the method outlined than is usually devoted to procedures of this class, on the other hand much greater benefit accrues to the patient, and consequently a fee commensurate with the service rendered can be charged. In addition to the advantages mentioned, service rendered of the character described represents the highest type of scientific prosthetic art, and this should in itself be an incentive to every practitioner to familiarize himself with and become proficient in the anatomical articulation of artificial dentures.—J. H. PROTHERO, *Dental Summary.*

Antiseptic Solutions for Use in the Mouth.—As the result of a series of investigations on the antiseptic power of a number of medicinal solutions and of the time required to keep these solutions in contact with the tissues of the mouth in order to bring about a maximum degree of sterilization, we are enabled to publish the following data on the dilution of these agents and the time they should be held in the mouth:

Benzoic acid, 1:100; 15 seconds.

Boric acid, 1:50, at least 11 minutes.

Carbolic acid, 1:100; over 5 minutes.

Eugenol, 1:750; over 15 minutes.

Hydrogen dioxid sol., 2:100; over 6 minutes.

Iodin trichlorid, 1:2000; over 1¼ minutes.

Lysol, 1:200; over 5 minutes.

Mercuric chlorid, 1:2500; one-half to 1 minute.

Oil of cinnamon, 1:400; over 8 minutes.

Oil of cloves, 1:550; over 11 minutes.

Oil of eucalyptus, 1:625; over 9 minutes.

Oil of gaultheria, 1:350; over 12 minutes.

Oil of peppermint, 1:600; over 11 minutes.

Potassium permanganate, 1:1400; over 15 minutes.

Saccharin, 1:400; 45 seconds.

Salicylic acid, 1:300; 45 to 60 seconds.

Thymol, 1:2000; over 5¼ minutes.—*La Odontología,* per *Pacific Dental Gazette.*

Action of the Faradic Current on the Pulp.—The action of the electric current on a sound tooth calls forth a definite sensation which is in accordance with the normal reaction as exhibited by the patient to electric stimulation. The strength of the current required for this purpose varies with the individual. The perception manifests itself in a peculiar tingling sensation, but not in pain. This point is known as the irritation point. After having established the irritation point in the sound teeth of the patient, it is a simple matter to distinguish the reaction of a diseased pulp from that of a normal pulp. The following scheme may serve as a guide for making a diagnosis by means of the faradic current: The normal pulp responds to the faradic current at its irritation point. The irritated pulp responds very readily to the faradic current at the irritation point, or just *slightly below* it. The inflamed pulp responds to the faradic current *below* the irritation point. The more severe the inflammation, the more ready the response to the current. The inflamed pulp with pus infiltration responds to the faradic current *above* the normal irritation point. The more severe the purulent condition, the less ready the response to the current. The dead pulp *does not respond at all*, not even to the full strength of the faradic current.—H. Prinz, *Dental Summary*.

Erotic Hallucinations Following Cocain Pressure Anesthesia.—Prof. V. E. Henderson of the University of Toronto, Canada, in the March number of the *Dominion Dental Journal*, relates a case that should serve as a warning to all those who use cocain as a local anesthetic to be careful to safeguard themselves by having a third party present, as they do when administering a general anesthetic.

A dentist treating a small, somewhat nervous girl of sixteen years, found a molar with an exposed pulp, and proceeded, after cleansing the cavity without causing pain, to apply a paste of cocain crystals and alcohol, covering it with unvulcanized rubber and applying pressure in the usual manner, and in a few minutes removed the pulp painlessly. An appropriate dressing and temporary filling were then inserted, and the patient was dismissed.

The next day she returned with her mother and brother-in-law and charged him with placing his hands up her clothes, touching her skin, and with other improprieties. The complainants demanded an apology, and one not being forthcoming, the matter was carried to the police and a charge made of indecent assault. A trial resulted. The evidence sifted down to the charge made by the complainant and the denial of the defendant, and the judge, in dismissing the prisoner, stated that he would not consider the expert testimony offered, but that as it was the unsubstantiated story of the man as against that of the girl, he had no course open to him but to dismiss the prisoner.

Dr. Henderson cites numerous references to cases of erotic hallucination following the use of cocain as a local anesthetic reported in foreign journals, sufficient to establish the fact of this possible effect of local cocain anesthesia, and suggests that it should be more generally known and guarded against. This publication is timely, as various methods of using anesthetic agents to make dental operations painless are coming to the fore. The fact that consciousness is not lost has usually been considered a factor of safety. Cocain hallucinations do not immediately follow its administration, but may come on some time later, after the patient has returned home. Timely precautions may save much trouble; they are in order whenever anesthetic agents are used.—W. H. Trueman, *Dental Brief*.

Impediments in Speech.—The recognition of the value of co-operation between rhinologists and dentists has come rather late in the day. Angle initiated it when he declared that the rhinologist must work hand in hand with the orthodontist, since each was equally dependent upon the other. The practitioner who deals with abnormalities of speech is at least as dependent upon the orthodontist as is the rhinologist. There are a large number of cases of defective enunciation which derive directly either from malocclusion or from cleft palate. The statistics published as a result of my two years' research in the municipal school for children with defective speech at Breslau, reveal the fact that thirty per cent. of the cases were due to defective teeth, and about another thirty to malocclusion. The characteristic anomalies in all these cases were lisping, sidewise hissing, and mispronunciation of the labial and the labio-dental sounds.

The commonest form of disturbance met with in dental practice is that following the insertion of a denture or a piece of bridge work. This usually disappears comparatively quickly. I should like, however, in this connection, to make a suggestion on a point sometimes overlooked by dentists. The insertion of complete dentures occasionally produces a permanent difficulty in the articulation of sibilants. Since the clearness of

these sounds depends upon the meeting of the teeth, the difficulty may easily be obviated.

The regulation of the teeth, if carried to a successful conclusion, will restore normal articulation of the dento-labial sounds, but sibilants will often remain defective. In such cases the patient must be taught to place the tongue in the right position behind the lower teeth, and so direct the breath that it passes exactly between the opposing rows of teeth. This end may sometimes be attained by allowing the patient to blow into the hollow of a key. A few weeks of practice and goodwill generally suffice to conquer this difficulty.

The impediments produced by cleft palate offer serious difficulties. The characteristic disappearance of the stream of air through the nose in the articulation of *m*, *n*, *ng*, where, normally, the air should pass through the mouth, may be almost entirely overcome by exercises in breathing, alternately holding the nostrils and setting them free. The practice of single sounds and of the control of the direction of the breath will do much.

Trélats tells us of cases where speech and breathing exercises have been successfully applied to unoperated cases of cleft palate without an obturator. Here of course permanent exercises are necessary. Ordinarily they should be begun soon after the usual operation, that is to say at the age of from four to five years, with and without the obturator. The time required, varying with the skill and intelligence of the patient, is usually from three to six months.—E. PASCH, *Deutsche Monatsschrift für Zahnheilkunde*, per *Dental Record*.

HINTS, QUERIES, AND COMMENTS.

THE NAVY DENTAL CORPS.

General Information.

TO THE EDITOR OF THE DENTAL COSMOS:

For the general information of the dental profession and those who may desire to enter the Dental Corps of the United States Navy I desire to state that in the act of August 22, 1912 (Naval Appropriation Bill making appropriations for the navy for the ensuing year) is contained a provision AUTHORIZING A DENTAL CORPS FOR THE NAVY.

In addition to the dental corps, to consist of thirty acting assistant or assistant dental surgeons the age of whom on appointment must be between twenty-four and thirty-two years of age, provision was made for a limited number as acting assistant dental surgeons for temporary service.

After having passed the required examinations, appointees serve a probationary period as acting assistant dental surgeons for a period of three years, at the end of which time they are examined to determine their fitness for appointment as assistant dental surgeon. Upon successfully passing the examination for appointment as assistant dental surgeon, the candidate receives a commission, being nominated by the President and confirmed in the Senate in the same manner as other commissioned officers of the navy.

Officers of the dental corps have the rank of lieutenant (junior grade) and are entitled to all the military courtesies and consideration that go with that rank and are accorded officers of other branches of the service in a similar grade. They wear the same uniform as other officers of the navy, with a designating device distinctive of their corps.

Officers of the dental corps receive the pay and allowances of lieutenant (junior grade) —namely, \$2000, or \$166.66 per month. At the end of each five years' active service an increase of 10 per cent. is given, until at the end of twenty years the maximum increase of 40 per cent. is received, making \$2800 annually, or \$233.33 per month, with a further increase of 10 per cent. when serving at sea or on a foreign station. When on shore duty they are furnished with quarters either in kind, three rooms, or commutation at the rate of \$36 per month. An allowance for fuel and light is also provided. When traveling under orders, mileage is allowed at the rate of 8 cents per mile. Leave of ab-

sence on full pay may be granted by the proper authority at the rate of one month per year. Absence from duty on account of sickness involves no loss of pay.

The tenure of office in the dental corps of the navy—except in case of acting assistant dental surgeons appointed for temporary duty only—is for life, unless sooner terminated by removal, resignation, disability, or other casualty.

All officers of the dental corps (except temporary appointees) are retired from active service at the age of sixty-four years, and when so retired (or when retired from active service for disability or other casualty contracted in the line of duty before that age) receive an annual pay for life amounting to three-fourths of the highest pay of their grade at the time of retirement.

When any officer of the navy, including dental officers, has been thirty years in the service, he may, upon his own application, in the discretion of the President, be retired from active service and placed on the retired list with an annual pay for life amounting to three-fourths of the highest pay of his grade at the time of retirement.

Immediately upon official notification of the death of any officer, including dental officers, from wounds or disease not the result of his own misconduct, there will be paid to the widow, children, or dependent relative of such officer, previously designated by him, an amount equal to six months' pay at the rate received by such officer at the date of his death, less $75 to defray the expenses of interment; but the residue, if any, of the amount so reserved will be paid subsequently to the widow or other designated beneficiary.

It is believed that the status, pay, and allowances and other incidentals of the corps should make the service desirable and attractive to such dental practitioners as may think they would enjoy a naval life. Assignment to duty may be made to navy-yards, naval training stations, hospital ships, and aboard vessels of the fleet.

The physical examination for a candidate to the dental corps is thorough, and he is required to certify, on oath, that he is free from all mental, physical, and constitutional defects.

A knowledge of the common school branches is required. Credit will be given for knowledge of languages and the sciences, which, however, is not essential.

For further information address the Surgeon-general, U. S. N., Navy Department, Washington, D. C.

EMORY A. BRYANT,
A. A. Dental Surgeon, U. S. N.

PRESERVATION OF THE VITALITY OF ABUTMENT TEETH IN CROWN AND BRIDGE WORK.

IN a paper on "Crown and Bridge Work, Past and Present," published in the DENTAL COSMOS, December 1913, p. 1245, Dr. J. L. Howell of Denver, Colo., asserts that devitalization of teeth is demanded when crown and bridge work is indicated. I have practiced dentistry for thirty-nine years, but have never destroyed a pulp in a tooth requiring a shell crown, unless there was an exposure. In my own mouth I have seven abutment teeth capped with shell crowns, and supporting stationary bridges of altogether eight porcelain teeth, which I made and inserted myself thirteen years ago without any assistance. These abutment crowns and teeth are as sanitary as were my natural teeth—I am of course in the habit of brushing them after every meal. The crowned teeth have not been deranged in any way, and have caused no trouble whatever in all these years. I therefore do not agree with Dr. Howell that teeth should be devitalized before crowning, excepting in cases of pulp exposure. In all my practice I have done to others as I have to myself, viz, saved the vitality of a tooth whenever possible, and I have never had any complaints from my patients as to their crowned vital teeth causing trouble. My belief that a dead tree in a field is not as desirable as a live one also applies to teeth.

L. W. JONES, D.D.S.
Cleveland, Ohio.

MECHANICALLY CLEANSING SALIVA EJECTORS.

PIPE cleaners that can be purchased in any tobacco store may be conveniently used for mechanically cleansing saliva ejectors.

E. W. FLOHR, D.D.S.
North Milwaukee, Wis.

RECEPTACLE FOR KEEPING CEMENTS COOL IN SUMMER.

VARIOUS means have been suggested for overcoming the unduly rapid setting of cements, especially silicate cements, during the hot days of summer. Cooling with ice is rather unsatisfactory, as the chill is too sudden and too severe, and the setting process is therefore unfavorably influenced.

A device more satisfactory in regard to evenness of temperature and cost of upkeep than a miniature refrigerator can be constructed in the following manner: An earthen jar or crock with cover is buried up to the brim in moist sand packed in a wooden box, which, if desired, may be lined with felt or tin-sheeting, or in a tin such as is used in groceries. The lids of the outer box and of the jar must both be kept closed, and the sand kept moist, to insure uniform coolness of the cement, the liquid, the mixing slab, and the spatula. This uniform coolness of the factors concerned in the mixing process insures a most satisfactory and even mixture, which cannot be as easily obtained by merely chilling the slab with ice. Care must be taken to wipe off any water of condensation from the warm and humid atmosphere of our summer days that may collect on the necks of the bottles, the spatula, and the slab upon their being removed from the cool receptacle, as such moisture upsets the balance of the mixture. The ideal receptacle for cements would, of course, be a case with vacuum chamber walls, on the principle of the Thermos bottle. Until the manufacturers offer us such a receptacle, also a mixing-slab with either a vacuum chamber or a basin for cold water in its body, the contrivance described will be found satisfactory.

RICHARD H. RIETHMÜLLER, PH.D., D.D.S.
Philadelphia, Pa.

THE USE OF A CORE IN IMPRESSION-TAKING.

IN the Periscope of the DENTAL COSMOS, January 1914, p. 127, a description was published regarding a method, by H. J. Trude, for obtaining a correct impression of overhanging molars by the use of a core. The method described is somewhat complicated, requiring a preliminary impression of the leaning tooth, then the making of a cast tin hood for it. A simpler method consists in making a core of quick-setting cement. This can be done as quickly and easily as the insertion of a cement filling; the impression is then taken, either in plaster or modeling compound, and after removing the impression and core from the mouth, the core is placed in the impression.

In cases of overhanging molars, the retention of the plate is greatly aided, but in many cases of undercuts nothing is gained by securing exact impressions of them, for the very good reason that the plate has to be cut away afterward at these points, in order to allow of its insertion. Therefore a modeling compound impression is often, though not always, as serviceable as one of plaster, and has the additional advantages of not expanding, like plaster of Paris, or of fracturing.

STEWART J. SPENCE.
Chattanooga, Tenn.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS: April, May, and June.

APRIL.

Academy of Stomatology of Philadelphia. April 28th.

Connecticut State Dental Association. Hartford. Three days: April 21st to 23d.

Eastern Association of Graduates of Angle School of Orthodontia. New York, N. Y. Three days: April 23d to 25th.

Missouri State Dental Association. St. Louis. Two days: April 21st and 22d.

Oklahoma State Dental Association. Oklahoma City. Six days: March 30th to April 4th.

Texas State Dental Association. Fort Worth. Five days: April 13th to 17th.

MAY.

Canadian Dental Association. Winnipeg, Man. Four days: May 26th to 29th.

Dental Society of the State of New York. Albany. Three days: May 14th to 16th.

Iowa State Dental Society. Des Moines. Three days: May 5th to 7th.

Lake Erie (Pa.) Dental Association. Cambridge Springs. Three days: May 21st to 23d.

Massachusetts State Dental Society. Boston. Three days: May 7th to 9th.

National Dental Protective Association. Washington, D. C. May 19th.

South Dakota Dental Society. Sioux Falls. Two days: May 12th and 13th.

Susquehanna (Pa.) Dental Association. Delaware Water Gap. Three days: May 26th to 28th.

Vermont State Dental Society. Rutland. Three days: May 21st to 23d.

JUNE.

Colorado State Dental Association. Colorado Springs. Three days: June 25th to 27th.

Louisiana State Dental Society. Baton Rouge. Three days: June 4th to 6th.

Maine Dental Society. Augusta. Three days: June 25th to 27th.

Mississippi Dental Association. Vicksburg. Three days: June 23d to 25th.

New Hampshire Dental Society. Weirs. Three days: June 17th to 19th.

Pennsylvania State Dental Society. Philadelphia. Three days: June 30th to July 2d.

South Carolina State Dental Association. Chick Springs. Three days: June 17th to 19th.

Examiners' Meetings.

Maine Board of Examiners. Augusta. June 23d and 24th.

Maryland Board of Examiners. Baltimore. May 27th and 28th.

New Jersey Board of Examiners. Trenton. June 29th to July 1st.

Ohio State Dental Board. Columbus. June 16th.

Oklahoma Board of Examiners. Oklahoma City. May 18th to 22d.

Pennsylvania Board of Examiners. Philadelphia and Pittsburgh. June 10th to 13th.

South Carolina Board of Examiners. Chick Springs. June 12th.

Tennessee Board of Examiners. Nashville. June 15th to 19th.

Texas Board of Examiners. Dallas. June 22d.

Wisconsin Board of Examiners. Milwaukee. June 22d.

Washington State Board of Examiners. Seattle. (Some time in May.)

XI PSI PHI FRATERNITY.

Proposal to Form an Alumni Association of Pi Chapter (Univ. Pa.).

We invite all graduate members of the Xi Psi Phi Fraternity of the University of Pennsylvania to aid in the formation of an Alumni Association of Pi Chapter and become members. The committee would be pleased to receive the names and addresses of all members, as our records are incomplete. We solicit your efforts in behalf of the Alumni Association of our fraternity, and will be glad to furnish any further particulars.

Chas. Steffens, *Chairman*,
T. F. Carroll,
3612 Walnut st., Phila., Pa.

Sixth International Dental Congress.

London, August 3 to 8, 1914.

Patron: His Majesty the King.

The Sixth International Dental Congress will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and to the self-governing Dominions of the Empire to send official representatives to the congress.

The Committee of Organization (appointed under Art. XVI of the International Dental Federation) has completed the list [following] of Sections, Officers, and Subjects for Report and Debate. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

The International Dental Congress Museum is intended to be representative of every section of the congress. [See page 521.]

A Demonstrations Committee is being organized, with Mr. T. A. Coysh as chairman and Mr. W. F. Mellersh as hon. secretary.

Independent papers and demonstrations: These must be notified, before April 15th, to the secretary of the appropriate section, the council of which has the right to make selection and to decline any not desired. Notifications received after April 15th can be considered only after the program has been arranged subject to selection by the president of the section. Fifteen minutes will be allowed for the reading of a paper.

Papers may be written in English, French, or German, and must be delivered to the secretary of the section concerned, preferably typewritten and ready for printing. An abstract or summary to reach the secretary of the section *before June 1st*. Notices of demonstrations, including a list of the demonstrator's requirements, by same date.

Copyright of communications to the congress becomes the property of the Committee of Organization.

Reports: In each section a time will have been reserved for the discussion of important, selected questions, each discussion being introduced by one or more "reporters" chosen by the council of the section. The manuscripts of reports must be typewritten and must be sent in before April 15th, so that they may be printed and distributed as soon as possible to all members who have been enrolled. Reports will not be read *in extenso*. Each reporter will be allowed fifteen minutes for an opening *résumé* and ten minutes in closing discussion. For other speakers, a maximum of five minutes.

The hon. secretaries of Section IX would be glad to hear from gentlemen in all countries willing to give *short* demonstrations of lantern slides. [See page 521.] It is hoped to make this a valuable feature.

The Rules make eligible for membership all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of that in which they practice.

At the closing meeting (Saturday, August 8th) the President will submit the amended constitution of the International Dental Federation to the vote, and will announce the place and date of the next congress.

The subscription for members will be 30s. (38 francs; 31 marks; $7.50); for members of their families accompanying them, 15s. (19 francs; 15½ marks; $3.75).

Subscriptions (by postal order, draft or check) payable to the treasurer Sixth International Dental Congress, who will send a formal receipt. (With application, inclose card, with dental or medical qualifications and titles, and full postal address—any change in which must be immediately notified.)

Members will receive the official program, the daily journal of the congress, the catalogs of the exhibitions, and the Transactions.

Correspondence should be addressed to the Officers of the Congress, as follows:

Hon. General Secretaries,
Sixth International Dental Congress,
19 Hanover Square, London, W.

ORGANIZATION.

Officers.

President: J. Howard Mummery, M.R.C.S., L.D.S.Eng.

Vice-Presidents: W. B. Paterson, L. Matheson, W. Guy, Dr. A. W. W. Baker, and the President of the British Dental Association.

President of Committee of Organization: W. B. Paterson, F.R.C.S., L.D.S.Eng.

Hon. Treasurer: H. Baldwin, M.R.C.S., L.D.S.Eng.

Hon. General Secretaries: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.D.S.Eng.; H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.

Committee of Organization.

H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.; Wm. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.; Walter Harrison, L.D.S., D.M.D.Harvard; J. Howard Mummery, M.R.C.S., L.D.S.; W. B. Paterson (president of the committee), F.R.C.S., L.D.S.

Appointed by the British Dental Association.

J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.; H. Baldwin, M.R.C.S., L.D.S.; Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.; Walter H. Coffin; W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.; A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.; Montagu F. Hopson, L.D.S.; L. Matheson, L.D.S.; Frank J. Pearce, L.D.S., D.D.S.Penn. (hon. secretary of the committee); G. O. Whittaker, L.D.S.

THE SECTIONS.

Section I.—Dental Anatomy, Histology, and Physiology.

OFFICERS.

President: A. S. Underwood, M.R.C.S., L.D.S.Eng.

Hon. Presidents: Monsieur J. Choquet, Paris; Dr. M. H. Cryer, Philadelphia, U.S.A.; Hofrat Professor Dr. O. Walkhoff, Munich.

Vice-Presidents: D. E. Caush, L.D.S.I.; J. Humphreys, L.D.S.I., M.D.S.Birm.; and J. A. Woods, L.D.S.Eng., M.D.S.Liv.

Hon. Secretaries: E. C. Sprawson, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. W. Wellings, L.D.S.Edin., B.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

The Evolution of the Human Dentition.

Calcification.

Chemistry and Physiology of Saliva.

Section II.—Dental Pathology and Bacteriology.

OFFICERS.

President: A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Cavalié, Bordeaux; Dr. T. B. Hartzell, Minneapolis, U.S.A.; and Professor Dr. Römer, Strassburg.

Vice-Presidents: F. J. Bennett, M.R.C.S., L.D.S.Eng.; J. Lewin Payne, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. W. Watson, L.D.S.Edin.

Hon. Secretaries: S. P. Mummery, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. G. G. Plumley, M.B.Lond., L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Etiology of Dental Caries.

The Etiology and Pathology of "Pyorrhea Alveolaris."

The Pathology of the Antrum.

Pathological Conditions of the Dental Pulp.

Discussion on the British Dental Association Odontome Catalog.

Section III.—Dental Surgery and Therapeutics.

OFFICERS.

President: W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Dieck, Berlin; Dr. E. S. Gaylord, New Haven, U.S.A.; Dr. Pont, Lyons.

Vice-Presidents: W. Hern, M.R.C.S., L.D.S.Eng.; J. B. Parfitt, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. O. Whittaker, L.D.S.Eng.

Hon. Secretaries: F. N. Doubleday, L.R.C.P., M.R.C.S., L.D.S.Eng.; and W. Parker Harrison, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) The Inflammatory Diseases of the Gingival Margin and Periodontal Membrane (pyorrhea alveolaris).

(*a*) The clinical signs.

(*b*) Local treatment.

(*c*) Treatment by ionic medication.

(*d*) Treatment by vaccines.

Note.—It is particularly requested that all papers should be accompanied by photographs, radiograms, etc., demonstrating the progress of cases cited and the results of treatment.

(2) The Restoration of Lost Portions of Tooth Substance by Inlaying.

(*a*) Inlay materials and their manipulation.

(*b*) Principles of cavity preparation.

(*c*) The cement lute.

(*d*) Comparison of inlays with fillings.

(3) Oral Sepsis.

(*a*) Oral sepsis in relation to general disease.

(*b*) The prevention of oral sepsis.

(*c*) The treatment of oral sepsis.

(*d*) The question of crowns, bridges and dentures in relation to oral sepsis.

Section IV.—Dental Physics, Chemistry, Radiography, and Metallurgy.

OFFICERS.

President: Montagu F. Hopson, L.D.S.Eng.

Hon. Presidents: Dr. J. P. Buckley, Chicago, U.S.A.; Monsieur Franchette, Paris.

Vice-Presidents: C. A. Clark, L.D.S.I.; H. T. Dreschfeld, L.D.S.Edin.; and R. Lindsay, L.D.S.Edin.

Hon. Secretaries: W. B. Hepburn, L.D.S.Glas., and A. E. Ironside, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Uses and Advantages of X Rays as an Aid to Diagnosis, including the differentiation of the radiographic appearances of normal and abnormal tissue.

The Structural and Other Changes Arising in Connection with Metals Used in the Mouth.

The Theory and Practice of Pressure Casting. This report will be taken at a conjoint meeting with Section V. The Reporters chosen for Section IV will deal with the *theory.*

Section V.—Dental Prosthesis.

OFFICERS.

President: W. Simms, L.D.S.I.

Hon. Presidents: Dr. D. O. M. LeCron, St. Louis, U.S.A.; M. Paul Martinier, Paris; Professor Dr. Riegner, Breslau.

Vice-Presidents: G. Brunton; D. P. Gabell, L.R.C.P., M.R.C.S., L.D.S.Eng.; G. J. Goldie, L.R.C.P.&S., L.D.S.Edin.

Hon. Secretaries: H. J. Morris, L.D.S.Eng., and Wilton Thew, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

Articulation and Articulators.

Design and Retention of Partial Dentures.

The Theory and Practice of Pressure Casting. Conjointly with Section IV. Reporters for Section V will deal with the *practice.*

Section VI.—Orthodontics.

OFFICERS.

President: J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Dr. R. A. Day, San Francisco, U.S.A.; Dr. Leon Frey, Paris; Zahnarzt Schröder-Benseler, Cassel.

Vice-Presidents: G. G. Campion, L.D.S.Eng., G. Northcroft, L.D.S.Eng., D.D.S.Mich.; W. Rushton, L.D.S.Eng.

Hon. Secretaries: H. Chapman, L.D.S.Eng., D.D.S.Penn.; E. L. Councell, L.R.C.P., M.R.C.S., L.D.S.Eng., B.D.S.Liv.

SUBJECTS FOR REPORT AND DEBATE.

The Unification of Terminology and Classification.

The Problem of Retention, with a view to Permanence of Result and Minimum of Danger.

Nasal Obstruction in relation to Orthodontics; in two parts, viz: (*a*) The Effects of the Secretions of the Ductless Glands. (*b*) The Effect of the Expansion of the Dental Arches, with or without the Opening of the Sutures.

Root Movement.

The Relative Advantages of Fixed and Movable Appliances.

Section VII.—Oral Surgery and Surgical Prosthesis.

OFFICERS.

President: J. G. Turner, F.R.C.S., L.R.C.P., L.D.S.Eng.

Hon. Presidents: M. Leon Delair, Paris; Dr. J. D. Patterson, Kansas City, U.S.A.; Sch.-Rat Professor Dr. Partsch, Breslau; Professor Dr. Schröder, Berlin.

Vice-Presidents: T. S. Carter, L.D.S.Eng.; W. W. James, F.R.C.S., L.R.C.P., L.D.S.Eng.; G. M. P. Murray, F.R.C.S.I.

Hon. Secretaries: H. P. Aubrey, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. Barritt, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) Surgical Prosthesis of the Jaws.

(2) Late Results of Cleft Palate Operations.

(3) Treatment of Dental and Dentigerous Cysts.

One morning will be devoted to each subject; the rest of the time will be devoted to papers on subjects of surgical interest in the mouth.

Section VIII.—Anesthesia (General and Local).

OFFICERS.

President: W. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.

Hon. Presidents: Dr. T. P. Hinman, Atlanta, U.S.A.; Dr. J. Vichot, Paris; Professor Dr. Williger, Berlin.

Vice-Presidents: J. H. Gibbs, F.R.C.S., L.D.S.Edin.; W. A. Hunt, L.R.C.P., M.R.C.S.; J. W. Pare, M.D., C.M.Edin., L.D.S.Eng.

Hon. Secretaries: F Coleman, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. H. Parrott, L.D.S.Eng., L.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

Gas and Oxygen, alone, in mixture, and in sequence, for the Extraction Operation.

Gas and Oxygen Analgesia for Conservative Operations.

Local Anesthesia with special reference to (*a*) Methods, (*b*) Drugs, (*c*) Sphere of Usefulness, (*d*) Contra-indications and Dangers.

Section IX.—Oral Hygiene, Public Instruction, and Public Dental Services.

OFFICERS.

President: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Jessen, Strassburg; Dr. Siffre, Paris; Dr. Herbert L. Wheeler, New York City.

Vice-Presidents: A. E. Baker, L.R.C.P., M.R.C.S., L.D.S.Eng.; Walter Harrison, L.D.S.Eng., D.M.D.Harv.; J. Sim Wallace, D.Sc., M.D., C.M.Glas., L.D.S.Eng.

Hon. Secretaries: C. F. Peyton Baly, L.R.C.P., M.R.C.S., L.D.S.Eng.; W. R. Wood, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Effects of Dental Treatment on National Health and Physique.

Prophylaxis at Different Ages.

Lantern demonstration of slides showing (*a*) Means of affording Public Instruction in Dental Hygiene, *e.g.* lecture material, charts, etc.; (*b*) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or other Institutions in which public dental treatment is being carried out. To be contributed to by all countries willing to send representatives. It is intended that many dentists should exhibit slides showing the working of institutions, or of public instruction, and very briefly describe them.

Section X.—Dental Education.

OFFICERS.

President: W. H. Gilmour, L.D.S.Eng., M.D.S.Liv.

Hon. Presidents: Dr. Conrad Cohn, Berlin; Dr. Henry W. Morgan, Nashville, U.S.A.; Dr. Maurice Roy, Paris.

Vice-Presidents: T. Gaddes, M.D.Denver, L.D.S.Eng. and Edin.; F. W. Richards, L.D.S.Eng.; R. Wynne Rouw, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Secretaries: F. B. Bull, L.D.S.Eng.; G. Sheppard, L.D.S.Eng., F.R.C.S., L.M.I., L.R.C.P.I.

SUBJECTS FOR REPORT AND DEBATE.

The Teaching of Bacteriology for Dental Students, with special reference to (*a*) the Method of Teaching; (*b*) the Extent of the Teaching.

A Practical Synopsis of Medical and Surgical Teaching for Dental Students.

First Principles in Practical Teaching.

Methods of Teaching Orthodontics to Dental Students.

Sixth International Dental Congress.

THE CONGRESS MUSEUM.

ITS NATURE AND SCOPE.

THE Museum will be an international collection of objects of interest, and be representative of every section of the congress. Its nature and scope include—

1. Specimens showing the Evolution of Tooth Forms and of the Dentition of Man. Histological Preparations bearing upon recent research. Exhibits illustrating the Chemical Composition and Physiological Action of the Saliva.

2. Specimens of Morbid Conditions of the Teeth, Palate, Gums, and Jaws, such as Odontomes, Dental and Dentigerous Cysts. New Growths, Diseases of the Periodontal Membrane, etc. Photomicrographs of Oral Micro-organisms, and Cultures of Micro-organisms in Test Tubes or in Petri Dishes. New Bacteriological Apparatus and Appliances.

3. Specimens of Teeth, Gums, and Jaws affected by "Pyorrhea Alveolaris." Microscopical and Lantern Slides of the same. Exhibits of Various New Methods of Inlaying Cavities in Teeth. Exhibits of New Methods of Crowning Teeth.

4. Radiographs of the Normal Dental Tissues, and of Diseases of the same and Associated Parts.

5. Exhibition of various kinds of Articulators. Specimens showing the various Methods of "Pressure Casting." Specimens showing modern forms of Continuous-Gum Work.

6. Models showing Abnormalities in Position of the Teeth, and Appliances for the Correction of the same.

7. Specimens illustrating Methods of Dealing with Surgical Conditions of the Teeth and Jaws, including Cleft Palate, Hare-lip, Fracture and Resection of the Jaws.

8. Specimens illustrating the History and Evolution of Anesthesia.

9. Photographs, Charts, Diagrams, Specimens, and Statistics of School Clinics. Methods in the Instruction of the Public in the principles of Oral Hygiene.

10. Instruction Forms, Charts, Diagrams, Specimens, and Demonstration Models used in relation to Dental Education. The Specimens will include those employed for teaching purposes, and also Specimens of Work of both Students and Pupils, completed in accordance with the definite courses given.

11. Historical Objects of Interest, such as Books, Instruments, Pictures, etc.

Dr. A. Hopewell-Smith, chairman, earnestly invites co-operation in making this Museum of the Congress a success, and will be happy to forward the "Regulations," with "application and entry form" for intending exhibitors. Write him at International Dental Congress Office, 19 Hanover Square, London, W.

Sixth International Dental Congress.

ARRANGEMENTS OF THE AMERICAN NATIONAL COMMITTEE

APPOINTED BY THE NATIONAL DENTAL ASSOCIATION.

THE committee having in charge the affairs of the congress relating to the United States have selected the following to take part in the congress program:

Addresses.

Dr. H. J. BURKHART, Batavia, N. Y. Address on behalf of the National Dental Association at the opening session.

Dr. EDWARD C. KIRK, Philadelphia, Pa. Address before the general session, on the afternoon session of the opening day. Subject, "The Tendencies in Dental Education."

Reporters.

SECTION I: *Dental Anatomy, Histology, and Physiology.*

"The Evolution of the Human Dentition." Dr. I. N. Broomell, Philadelphia, Pa.

"Calcification." Dr. A. R. Starr, New York, N. Y.

"Chemistry and Physiology of Saliva." Dr. Edward C. Kirk, Philadelphia, Pa.

SECTION II: *Dental Pathology and Bacteriology.*

"The Etiology of Dental Caries." Dr. B. Holly Smith, Baltimore, Md.

"The Etiology and Pathology of 'Pyorrhea Alveolaris'." Dr. Percy R. Howe, Boston, Mass.

"Pathological Conditions of the Dental Pulp." Dr. R. W. Bunting, Ann Arbor, Mich.

"The Pathology of the Antrum." Dr. Chas. H. Oakman, Detroit, Mich.

SECTION III: *Dental Surgery and Therapeutics.*

"Inflammatory Diseases of the Gingival Margin and Periodontal Membrane: Pyorrhea Alveolaris." Dr. T. Sidney Smith, Palo Alto, Cal.

"Restorations of Lost Portions of Tooth Substance by Inlaying." Dr. R. Ottolengui, New York, N. Y.

"Oral Sepsis in Relation to General Disease." Dr. C. N. Johnson, Chicago, Ill.

"The Prevention of Oral Sepsis by Treatment." Dr. J. D. Patterson, Kansas City, Mo.

SECTION IV: *Dental Physics, Radiography, and Metallurgy.*

"The Uses and Advantages of X Rays as an Aid to Diagnosis, including the Differentiation of the Radiographic Appearances of Normal and Abnormal Tissue." Dr. Howard R. Raper, Indianapolis, Ind.

"The Structural and Other Changes Arising in Connection with Metals Used in the Mouth." Dr. Clarence J. Grieves, Baltimore, Md.

"The Theory and Practice of Pressure Casting." Dr. Weston A. Price, Cleveland, Ohio.

SECTION V: *Dental Prosthesis.*

"Articulation and Articulators." Dr. J. H. Prothero, Chicago, Ill.

"Design and Retention of Partial Dentures." Dr. H. J. Goslee, Chicago, Ill.

SECTION VII: *Oral Surgery and Surgical Prosthesis.*

"The Late Results of Cleft-Palate Operations." Dr. Truman W. Brophy, Chicago, Ill.

"The Treatment of Dental and Dentigerous Cysts." Dr. Wm. Carr, New York, N. Y.

"Surgical Prosthesis of the Jaws." Dr. M. C. Smith, Lynn, Mass.

SECTION VIII: *Anesthesia, General and Local.*

"Gas and Oxygen, Alone, in Mixture, and in Sequence, for the Extraction Operation." Dr. Chas. K. Teter, Cleveland, Ohio.

"Gas and Oxygen Analgesia for Conservative Operations." Dr. Thos. B. Hartzell, Minneapolis, Minn.

"Local Anesthesia with Special Reference to (a) Methods, (b) Drugs, (c) Sphere of Usefulness, (d) Contra-indications and Dangers." Dr. Eugene R. Warner, Denver, Colo.

SECTION IX: *Oral Hygiene, Public Instruction, and Public Dental Service.*

"The Effects of Dental Treatment on National Health and Physique." Dr. Herbert L. Wheeler, New York City.

"Prophylaxis at Different Ages." Dr. A. R. Melendy, Knoxville, Tenn.

"Lantern Demonstration of Slides, showing (a) Means of Affording Public Instruction in Dental Hygiene, *e.g.* Lecture Material, Charts, etc.; (b) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or Other Institutions in which Public Dental Treatment is being Carried Out." Dr. Wm. A. White, Phelps, N. Y.

SECTION X: *Dental Education.*

"Methods of Teaching Orthodontics to Dental Students." Dr. S. H. Guilford, Philadelphia, Pa.

The following have been selected as

Honorary Presidents of Sections.

I. *Dental Anatomy, Histology, and Physiology.* Dr. Mathew H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. Le Cron, London, England.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

A list of essayists and clinicians will be published later.

The committee invite the ethical members of the profession of the United States to become members of the congress. Membership, which includes admission to the congress sessions and a copy of the proceedings, is $7.50, and for members of their families accompanying them $3.75.

Dr. Herbert L. Wheeler, 560 Fifth ave., New York City, has been appointed by the committee to arrange for steamship rates, sailing dates, itinerary, etc. Those desiring to attend the congress, sailing with the American delegation—immediately following the meeting of the National Dental Association, Rochester, N. Y., which closes July 10, 1914—are requested to correspond with Dr. Wheeler.

[See also notice from Committee on Transportation, next page.]

TRUMAN W. BROPHY, *Chairman*,
WM. CARR,
S. H. GUILFORD,
WALDO E. BOARDMAN,
Committee.
BURTON LEE THORPE, *Sec'y*,
3605 Lindell Boulevard, St. Louis, Mo.

Sixth International Dental Congress.

COMMITTEE ON TRANSPORTATION

Has arrangements with the International Mercantile Marine Co., comprising the American, Atlantic Transport, Leyland, Red Star, White Star, and White Star-Dominion lines, whose fleet includes such large, splendid and steady steamers as the "Olympic," "Oceanic," "Adriatic," "Baltic," "Cedric," "Celtic," "Lapland," "Minnewaska," "Minnehaha," "Minnetonka," "Minneapolis," "Laurentic," and "Megantic," sailing to and from numerous prominent ports in England and the Continent. Our delegates receive 25 per cent. reduction on all the I. M. M. Co. steamers sailing east on and after July 9th, and to August 20th from Great Britain and Europe, except the "Olympic" August 19th from Southampton and Cherbourg for New York.

When the concession would bring the price for passage below the minimum rate of the steamer selected, the lowest rate of that steamer will be charged, as follows: *To* or *from*—

Plymouth, Cherbourg and Southampton: "Olympic," \$130.00; "Oceanic," \$110.00.

Queenstown and Liverpool: "Adriatic," \$110.00; "Baltic," "Cedric," and "Celtic," \$100.00.

Dover and Antwerp: "Lapland," \$97.50; other Red Star line steamers, \$85.00.

Plymouth, Cherbourg, and Southampton, "Majestic," \$95.00.

London, Atlantic Transport line, \$85.00.

Between Montreal–Quebec–Liverpool, "Laurentic" and "Megantic," \$92.50.

Communicate at once as to reservations with International Mercantile Marine Co., 9 Broadway, New York City, stating dates of proposed outward and return sailings, also accommodation requirements. Applications filled in order of receipt. A deposit of 25 per cent. of eastbound passage money required when reservation is made, balance payable three weeks prior to outward sailing.

The committee will also reserve dining-saloon seats, steamer chairs and rugs, the deck chairs and rugs renting at \$1.00 each for the voyage. Seats can also be reserved on the trains to London, for which the rates, first class, are as follows: Via Southampton, \$2.75; Plymouth, \$7.50; Liverpool, \$7.00; Dover, \$4.75.

The committee also calls the attention of delegates to the "travelers' checks" issued by the International Mercantile Marine Co. in denominations of \$10.00, \$20.00, \$50.00, \$100.00 and \$500.00, which will be found the safest and most convenient way of carrying funds, as the checks are accepted by hotels, shops, banks, etc., throughout Great Britain and Europe. These are issued at face value, plus ½ of 1 per cent. commission, and checks not used will be redeemed at face value. It will be to the advantage of the association for its members to use these checks.

As the White Star sailings available for the congress, from New York, are on July 9th, 16th, 18th, arrangements have been made with the Holland-American line for those who wish to sail on Tuesday, 14th, to do so on their steamer "New Amsterdam," on which the following rates have been secured: They will allow a discount of 25 per cent. on the tariff rate, for all rooms on deck A (except the *chambres de luxe*), with the understanding that each room be occupied by three passengers. On decks B and C they will place at our disposal all outside and inside rooms we require, at the minimum rate per berth, provided that each room be occupied by three passengers. The number of passengers to be carried to be divided in proportion to available accommodations on decks A, B, and C.

Any communications concerning this boat should be sent to Mr. Nyland, Holland-American line, 21 State st., New York City.

The Transportation Committee has appointed Messrs. Thos. Cook & Son official Travel and Hotel Agents for the United States—this firm is acting in the same capacity in Europe—and an attractive program is about ready for distribution. Members are invited to make use of the facilities offered by Thos. Cook & Son. Arrangements can be made for membership in the special tours for whole or part, or independent steamer and rail transportation by any route desired, with hotel accommodations. Mail may be addressed in care of any of their offices and will be held pending receipt of instructions regarding disposal. At these offices will be found a staff of trained assistants for the purpose of assisting travelers with information and advice. Any further information will be furnished upon applying to 245 Broadway, New York City.

Herbert L. Wheeler, *Committee*,
560 Fifth ave., New York City.

AMERICAN DENTAL SOCIETY OF EUROPE.

ANNUAL MEETING—PARIS, JULY 30TH.

THE forty-first annual meeting of the American Dental Society of Europe will be held in Paris, France, July 30, 31, and August 1, 1914, at the Hotel Continental. All members of the profession are cordially invited to be present.

Officers, etc.

Officers: W. S. Davenport, 6 Ave. de l'Opéra, Paris, president; A. Chiavaro, 40 Via Nazionale, Rome, vice-president; G. B. Hayes, 17 Ave. de l'Opéra, Paris, secretary; O. Solbrig, 15 Boulevard Malesherbes, Paris, treasurer; C. F. Boedecker, Jr., Kurfuerstendamm 220, Berlin, microscopist.

Executive Committee: W. S. Davenport, chairman; G. B. Hayes, secretary; H. W. C. Boedecker, C. W. Roberts, Wm. M. Griswold, E. D. Barrows, C. H. Abbot, H. C. Merrill, O. Solbrig.

Membership Committee: A. Chiavaro, chairman; C. J. Monk, secretary; S. S. Macfarlane, W. M. Cooper, T. G. Patterson, K. A. Davenport, E. F. Day.

G. B. HAYES, *Sec'y.*

PRIZE COMPETITION

FOR DENTAL ESSAYS.

THE thirtieth anniversary of the *Oesterr.-ungar. Vierteljahrsschrift fuer Zahnheilkunde* (Petersplatz 7, Vienna I, Austria) begins with the year 1914. In commemoration thereof the editor offers three prizes—I, 1000 kronen (£40, $200); II, 600 kronen (£24, $120; III, 400 kronen (£16, $80)—for scientific work from any branch of dentistry, theoretical or practical, but awarded according to its clinical value. Herr Reg.-Rat Prof. Dr. Julius Scheff has accepted the chairmanship of the committee to award the prizes.

Rules. (1) The competition is open to dentists of all countries. In case the essay is in a foreign language a German translation must accompany it. (2) The essay must be original. (3) The essay must be sent in anonymously, bearing a certain word of identification, with a sealed envelope bearing the same word and containing the competitor's name and address. (4) The competition closes May 15, 1914, and prizes will be awarded July 15, 1914. (5) The successful essays will be published in the *Oesterr.-ungar. Vierteljahrsschrift fuer Zahnheilkunde* when the size permits. (6) The editor reserves the right to publish at the customary remuneration any of the essays of unsuccessful competitors.

NATIONAL DENTAL ASSOCIATION.

THE 1914 session of the National Dental Association will be held in Rochester, N. Y., July 7 to 10, 1914. The Local Committee have selected the Powers Hotel as the headquarters and have made the other necessary arrangements for a large attendance.

This is the first meeting of the association under the reorganization, and the House of Delegates, the governing body, will meet at 10.30 A.M., July 6th.

The officers and committees are expecting to present an exceptionally interesting program, the details of which, together with the other arrangements, will appear in the later journals and the next number of our Official Bulletin.

HOMER C. BROWN, *President,*
Columbus, Ohio.
OTTO U. KING, *Gen. Sec'y,*
Huntington, Ind.

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

THE annual meeting will be held in Washington, D. C., May 19, 1914, at the Dental Department of George Washington University, at 7.30 P.M., for the election of trustees and transaction of business.

E. P. DAMERON, *President,*
M. F. FINLEY, *Sec'y.*

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL.

THE following invitation has been extended to every graduate of the Angle School:

You are cordially invited to attend the annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, to be held at the Academy of Medicine, New York City, on April 23, 24, and 25, 1914.

Every item on the program will be of interest to the orthodontist. A full program will be mailed to you at a later date. Mark off the three days now, April 23d, 24th, and 25th.

A. W. CROSBY, *President.*

CANADIAN DENTAL ASSOCIATION.

The Canadian Dental Association meets for the first time in Winnipeg, Manitoba, May 26 to 29 inclusive, 1914, and a convention of unusual interest and profit is expected.

M. H. Garvin, *Sec'y*,
Winnipeg, Man.

TEXAS STATE DENTAL ASSOCIATION.

The thirty-fourth annual meeting of the Texas State Dental Association will be held at Fort Worth, Texas, April 13, 14, 15, 16, and 17, 1914.

In addition to the regular program, the Oklahoma postgraduate plan will be tried at this meeting. Dr. Geo. H. Wilson of Cleveland will present prosthetics with special reference to anatomical occlusion, and Dr. Frank H. Skinner of Chicago, pyorrhea, prophylaxis, and removable bridge work in connection with the same.

For information relative to space for exhibits, or as to clinics, address Dr. W. H. Nugent, Fort Worth, Texas. Any other information will be cheerfully furnished by the secretary.

Frank Forman, *President*,
Waco, Texas.
J. G. Fife, *Sec'y-Treas.*,
Dallas, Texas.

CONNECTICUT STATE DENTAL ASSOCIATION.

The fiftieth anniversary meeting of the Connecticut State Dental Association—James McManus, Hartford, president—will be held at Hartford, April 21, 22, and 23, 1914. Every committee in charge is doing its utmost to make this one of the finest meetings ever held in New England.

The papers will be by Dr. C. N. Johnson of Chicago, Dr. Charles R. Turner of Philadelphia, Dr. W. A. White and Dr. Darlington of New York, and Dr. W. H. Fitzgerald of Hartford. The clinics, while not many, are being selected with great care, and only men who have something to show will be there. The exhibits will surpass anything ever given in Connecticut.

A cordial invitation is extended to all ethical men out of the state to be present, and learn and enjoy some of the good things with us.

Arthur V. Prentis, *Sec'y*,
New London, Conn.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

A regular meeting of the Academy of Stomatology of Philadelphia will be held Tuesday, April 28, 1914, at the College of Physicians, at 8 P.M. sharp.

Dr. Frederick B. Noyes of Chicago, Ill., will present the paper of the evening, subject to be announced later.

F. R. Stathers, *Sec'y*,
Philadelphia, Pa.

OKLAHOMA STATE DENTAL ASSOCIATION.

The next meeting and third annual postgraduate course of the Oklahoma State Dental Association will be held in Oklahoma City, March 30 to April 4, 1914. Drs. Jos. B. Eby and Thos. P. Hinman of Atlanta, Ga., are to be the lecturers.

An important feature of the course will be a progressive clinic, conducted two afternoons of the week, by noted clinicians from out of the state.

C. R. Laurence, *Sec'y*,
Enid, Okla.

MISSOURI STATE DENTAL ASSOCIATION.

The forty-eighth annual meeting of the Missouri State Dental Association will be held in the Planters Hotel, St. Louis, Mo., April 21 and 22, 1914. A program of unusual interest has been prepared, including four illustrated papers by eminent dentists from outside the state.

S. C. A. Rubey, *Sec'y*,
Clinton, Mo.

IOWA STATE DENTAL SOCIETY.

The fifty-second annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 5, 6, and 7, 1914, beginning Tuesday, May 5th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. W. J. Cameron, Des Moines, Iowa.

C. M. Kennedy, *Sec'y*,
Des Moines, Iowa.

MASSACHUSETTS STATE DENTAL SOCIETY.

FIFTIETH ANNUAL MEETING.

THE fiftieth anniversary of the Massachusetts State Dental Society will be held on May 7, 8, and 9, 1914, at Hotel Somerset, Boston, Mass.

A. H. ST.C. CHASE, *Sec'y*,
Everett, Mass.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

THE fifty-first annual meeting of Lake Erie Dental Association will be held May 21, 22, and 23, 1914, at Hotel Bartlett, Cambridge Springs, Pa.

C. L. MEAD, *Sec'y*,
Union City, Pa.

SUSQUEHANNA DENTAL ASSOCIATION.

THE Susquehanna Dental Association will meet at the Water Gap House, Delaware Water Gap, Pa., May 26, 27, and 28, 1914. Cross these dates off on your appointment book NOW. Further information will be given later.

W. C. MIDDAUGH, *Pres.*,
E. G. DONNEGAN, *Sec'y.*

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE regular annual meeting of the South Dakota Dental Society will be held at Sioux Falls, S. D., May 12 and 13, 1914.

O. W. HANSON, *Sec'y*,
Madison, S. D.

VERMONT STATE DENTAL SOCIETY.

THE Vermont State Dental Society will hold its annual meeting in Rutland, Vt., May 21, 22, and 23, 1914.

P. M. WILLIAMS, *Sec'y.*

MAINE DENTAL SOCIETY.

THE forty-ninth annual meeting of the Maine Dental Society will be held at the New Augusta House, Augusta, Me., June 25, 26, and 27, 1914.

I. E. PENDLETON, *Sec'y*,
Lewiston, Me.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE forty-sixth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 14, 15, and 16, 1914. The literary program will be rendered at the new State Educational building. The clinics will be given at the Hotel Ten Eyck and the dental exhibits in the hotel rooms, as was arranged for the 1913 meeting, which proved very satisfactory to the exhibitors.

An exceptionally attractive meeting is being arranged. A cordial invitation is extended to all ethical dentists in New York and sister states.

Exhibitors please address Dr. O. J. Gross, 404 Union st., Schenectady, N. Y., for space.

There will be the usual reduction of railroad rates on the certificate plan.

The Executive Council will meet at the Hotel Ten Eyck on Wednesday, May 13th, at 3 P.M.

For further information, address

A. P. BURKHART, *Sec'y*,
52 Genesee st., Auburn, N. Y.

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at the New Hotel Weirs, Weirs, N. H., June 17, 18, and 19, 1914.

E. H. ALBEE, *President*,
LOUIS I. MOULTON, *Sec'y*,
Concord, N. H.

COLORADO STATE DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of the Colorado State Dental Association will convene at Manitou, Colo., June 25, 26, and 27, 1914. A cordial invitation is extended to all ethical practitioners to attend our meeting.

Clinicians and exhibitors desiring accommodations will please address Dr. E. I. Backus, 719 Exchange National Bank Building, Colorado Springs, Colo. Any other information will be cheerfully furnished by the secretary.

GEO. Y. WILSON, *President*,
Colorado Springs, Colo.
EARL W. SPENCER, *Sec'y*,
Pueblo. Colo.

PENNSYLVANIA STATE DENTAL SOCIETY.

The forty-sixth annual meeting of the Pennsylvania State Dental Society will be held at the Bellevue-Stratford Hotel, Philadelphia, on June 30, July 1 and 2, 1914.

Luther M. Weaver, *Sec'y*,
7103 Woodland ave., Phila.

LOUISIANA STATE DENTAL SOCIETY.

The thirty-sixth annual meeting of the Louisiana State Dental Society will be held in Baton Rouge, La., June 4, 5, and 6, 1914.

E. B. Ducasse, *Sec'y*.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-ninth annual meeting of the Mississippi Dental Association will be held in Vicksburg, June 23, 24, and 25, 1914.

M. B. Varnado, *Sec'y*,
Osyka, Miss.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The forty-fourth annual meeting of the South Carolina State Dental Association will be held at the Chick Springs Hotel, Chick Springs, S. C., on June 17, 18, and 19, 1914. All ethical practitioners invited to attend.

The clinic will be in charge of Dr. I. M. Hair, Greenville, S. C., who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. P. Carlisle, Greenville, S. C.

Any other information will be cheerfully furnished by W. Busey Simmons, *Sec'y*,
Piedmont, S. C.

NEW JERSEY STATE DENTAL SOCIETY.

The forty-fourth annual convention of the New Jersey State Dental Society will be held at the North End Hotel, Ocean Grove, N. J., July 15, 16, 17, and 18, 1914.

The hotel is situated on the ocean-front, at the foot of Wesley Lake. It is within a few feet of the Asbury Park Casino, and within a block of the Asbury Park trolley. The meetings will be held in the hotel, while the entire second floor of the pavilion will be devoted to the clinics and exhibits. This pavilion is over the ocean, with plenty of light and every chance for the cool sea breezes to blow through. A bridge over the boardwalk connects the hotel and pavilion, so that it makes an ideal arrangement for a convention.

An attractive meeting is being arranged, and a cordial invitation to attend is extended to all ethical dentists.

John C. Forsyth, *Sec'y*,
Trenton, N. J.

MINNESOTA STATE DENTAL ASSOCIATION.

The thirty-first annual meeting of the Minnesota State Dental Association will occur in Duluth, Minn., August 6, 7, and 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

Benjamin Sandy, *Sec'y*,
Minneapolis, Minn.

AMERICAN INSTITUTE OF DENTAL TEACHERS.

At the annual meeting of the Institute of Dental Pedagogics held at Buffalo, January 27, 28, and 29, 1914, the name of the organization was changed to American Institute of Dental Teachers. The following officers were elected for the ensuing year: Fred W. Gethro, Chicago, Ill., president; H. M. Semans, Columbus, Ohio, vice-president; John F. Biddle, 517 Arch st., N. S., Pittsburgh, Pa., secretary-treasurer. Executive Board—Shirley W. Bowles, Washington, D. C., A. W. Thornton, Montreal, Can., R. W. Bunting, Ann Arbor, Mich.

The next annual meeting will be held at Ann Arbor, Mich., January 28, 29, and 30, 1915.

J. F. Biddle, *Sec'y*.

CHICAGO DENTAL SOCIETY.

At the annual meeting of the Chicago Dental Society held December 16, 1913, the following officers were elected for the ensuing year: T. L. Grisamore, president; F. B. Moorehead, vice-president; P. B. D. Idler, secretary; R. E. Mac Boyle, treasurer; E. D. Coolidge, librarian; Two members on the Board of Directors—J. P. Buckley and G. C. Poundstone. Board of Censors—T. A. Broadbent, L. H. Arnold, and Ashley M. Hewett.

T. L. Grisamore, *Sec'y*.

AMERICAN ACADEMY OF DENTAL SURGERY OF NEW JERSEY.

At a meeting of the American Academy of Dental Surgery of New Jersey, held Friday, October 31, 1913, the following new members received the degree of Fellow of the American Academy of Dental Surgery: R. R. Andrews, M.D., D.D.S., Cambridge, Mass.; B. Holly Smith, M.D., D.D.S., Baltimore, Md.; Alfred C. Fones, D.D.S., Bridgeport, Conn.

H. S. Sutphen, *Sec'y.*

EASTERN DENTAL SOCIETY OF PHILADELPHIA.

A regular meeting of the Eastern Dental Society of Philadelphia was held December 4, 1913.

A paper entitled "Efficiency in Dentistry" was read by Dr. E. N. Englander.

L. Jacobs, *Librarian.*

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK.

A regular meeting of the Eastern Dental Society was held Tuesday evening, January 13, 1914, at the Café Boulevard, New York City, Dr. Albert G. Hindes presiding. Prof. Frederic A. Peeso delivered a lecture on "Crown and Bridge Work, with Special Reference to Preparation of Abutments for Fixed and Removable Bridge Work," which was of great benefit to all present. A discussion followed.

A. LeWitter, *Sec'y.*

INDIANA BOARD OF EXAMINERS.

Annual Registration of Dentists Required.

The registration of dentists under the new Indiana law is well under way. The new law calls for the annual registration of all dentists who have ever registered in Indiana, whether they are practicing in the state or not, if they wish to retain the right to practice at any future time.

Section 9 provides as the penalty for failure to renew within a period of three months after December 31st of each year the cancellation of said license. Provided that any license thus canceled may be restored by the board upon the payment of a fee of $5.00, if paid within one year after said cancellation. There is no provision for the restoration of a license thus canceled after a period of one year.

Dentists eligible to register should immediately send for application blanks to

F. R. Henshaw, *Sec'y,*
507–08 Pythian bldg., Indianapolis, Ind.

OKLAHOMA BOARD OF EXAMINERS.

The next regular meeting of the Oklahoma Board of Dental Examiners will be held at Oklahoma City, commencing Monday, May 18, 1914, and continuing through the 22d. All applications must be filed with the secretary ten days prior to date set for examination, and must be accompanied by a diploma from some reputable dental college.

For full particulars and application blanks address

E. E. Heflin, *Sec'y,*
Oklahoma City, Okla.

WASHINGTON STATE BOARD OF EXAMINERS.

The Washington State Board of Dental Examiners will meet in May 1914 at Seattle, Wash.

Pascal W. Yearsley, *President,*
Spokane, Wash.
R. L. Moak, *Sec'y,*
Montesano, Wash.

MARYLAND BOARD OF EXAMINERS.

The Maryland Board of Dental Examiners will meet for the examination of candidates for certificates May 27 and 28, 1914, at the dental department of the University of Maryland, Baltimore, at 9 a.m.

For application blanks and further information apply to

F. F. Drew, *Sec'y,*
701 N. Howard st., Baltimore.

OHIO STATE DENTAL BOARD.

The Ohio State Dental Board will meet in Columbus, Ohio, on June 16, 1914, to examine applicants to practice in the State of Ohio. Applications must be in the hands of the secretary June 5th.

Holston Bartilson, *Sec'y*,
150 E. Broad st., Columbus, Ohio.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners, for examination of applicants for certificate to practice dentistry in the State of Texas, will be held in Dallas, Texas, June 22, 1914, at the High-school building, beginning at 9.00 A.M.

No diplomas recognized; no interchange of licenses with other states. All applications, accompanied by the fee of $25.00, should be in the hands of the secretary not later than June 17th.

For further information, address

C. M. McCauley, *Sec'y*,
Abilene, Texas.

SOUTH CAROLINA BOARD OF EXAMINERS.

The next annual meeting of the South Carolina State Board of Dental Examiners will be held at Chick Springs, S. C., beginning Friday, June 12, 1914, at 10 A.M.

Examinations are theoretical and practical on regular college branches. Applicants must furnish instruments and material for any demonstrations called for by the board, and must exhibit diploma from a reputable dental college before being registered for examination.

For further information, address

R. L. Spencer, *Sec'y*,
Bennettsville, S. C.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee at Marquette University, on June 22, 1914, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations.

Special application blanks for this examination and $10 fee, together with high-school credits, to be filed fifteen days in advance.

F. A. Tate, *President*,
W. T. Hardy, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

PENNSYLVANIA BOARD OF EXAMINERS.

The next examination of the Pennsylvania Board of Dental Examiners will be held in Musical Fund Hall, Philadelphia, and the College of Pharmacy Building, Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 10, 11, 12, and 13, 1914. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

For further information, address

Alexander H. Reynolds, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly Chamber of the State-house, Trenton, N. J., on June 29, 30, and July 1, 1914. License fee, $25.00. No interchange of license. Applications must be filed *complete* with the secretary at least ten days before date set for examination.

All applicants for a license to practice dentistry in New Jersey—"shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college, he or she had obtained an academic education consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof." Therefore the secretary will issue application blanks to applicants only upon the presentation of the required dental certificate from the superintendent of public instruction, Trenton, N. J.

A bridge, consisting of three or more teeth, exclusive of abutments, and one Richmond

crown (gold metal) will be required, mounted and articulated, as a practical test in prosthetic dentistry, in place of a full set of teeth soldered upon a gold or coin silver plate as hitherto required.

For further particulars, appy to

Alphonso Irwin, D.D.S., *Sec'y*,
425 Cooper st., Camden, N. J.

MAINE BOARD OF EXAMINERS.

A meeting of the Maine Board of Dental Examiners will be held at the State-house, Augusta, June 23 and 24, 1914. For further information and applications apply to

I. E. Pendleton, *Sec'y*,
Lewiston, Me.

TENNESSEE BOARD OF EXAMINERS.

The Tennessee Board of Dental Examiners will meet in Nashville, June 15 to 19, 1914. Applicants must present diplomas from reputable dental colleges. The examinations will be written and clinical. Operations in operative and mechanical dentistry will be required. A fee of fifteen dollars is charged, and must accompany every application, which must be in writing.

The board will refuse license to anyone making false statements or cheating.

B. D. Brabson, *President*,
R. M. German, *Sec'y*.

ASSOCIATION OF MILITARY DENTAL SURGEONS.

Organization.

On January 24, 1914, at a meeting held at the Army and Navy Club, New York, N. Y., the Association of Military Dental Surgeons of the United States was organized, membership in which association is open to dental surgeons and acting dental surgeons of the United States army, and to ex-dental surgeons.

The officers chosen to serve until the Rochester meeting—at which time a new election will be held—are as follows: Wm. C. Fisher, president; John D. Milliken, San Francisco, vice-president; Ralph W. Waddell, treasurer; Wm. C. Fisher, 373 Fifth ave., New York, N. Y., secretary *pro tem.* *Advisory Council* ex-dental surgeons—O. M. Sorber, Updyke and Foster, Chas. D. Long, E. J. Craig, Samuel Hussey, H. C. Rietz, John S. Marshall, and Wm. Ware.

The object of this organization is to foster a higher *esprit de corps*, to encourage the interest of the dental profession at large in the *personnel* of the dental corps, and to collect for the dental profession such data and information pertinent to the practice of dentistry in the military sphere as may from time to time be deemed worthy of presentation.

Permanent organization will be effected at Rochester, N. Y., on the afternoon of the first day of the meeting of the National Dental Association, viz, July 7, 1914.

EXAMINATION OF DENTISTS FOR THE U. S. ARMY.

The Surgeon-general of the army announces that examinations for the appointment of acting dental surgeons will be held at Fort Slocum, New York; Columbus Barracks, Ohio; Jefferson Barracks, Missouri; Fort Logan, Colorado; and Fort McDowell, California, on Monday, April 13, 1914.

Application blanks and full information concerning these examinations can be procured by addressing the Surgeon-general, U. S. Army, Washington, D. C.

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between twenty-one and twenty-seven years of age, a graduate of a dental school legally authorized to confer the degree of D.D.S., and shall be of good moral character and habits.

Acting dental surgeons are employed under a three years' contract, at the rate of $150 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have the privilege of purchasing certain supplies at the army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon, with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must

be in the possession of the Surgeon-general at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present twenty-eight vacancies to be filled.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending December 20, 1913:

W. G. Torrence, ACT.D.S., December 12th, joined regimental hospital, Sixth Cavalry, Texas City, Texas.

Herman S. Rush, ACT.D.S., granted leave of absence for one month.

First Lieut. Hugh G. Voorhies is relieved from further duty with the Second division, and from treatment at the army and navy general hospital, Hot Springs, Ark., and will return without delay to his proper station, Fort Leavenworth, Kans., and report to the commanding officer of that post for duty.

For the week ending January 10, 1914—(No changes).

For the week ending January 17th:

First Lieut. J. H. Hess, January 3d, ordered to Fort George Wright, Wash., for temporary duty.

For the week ending January 24th—(No changes).

For the week ending January 31st:

U. M. Bryant, ACT.D.S., January 14th, ordered to Brownsville and Rio Grande, for temporary duty.

For the week ending February 7th—(No changes.)

For the week ending February 14th:

First Lieut. G. D. Graham, February 10th, ordered to Plattsburg Barracks, N. Y., for temporary duty until June 30th.

First. Lieut. Robert F. Patterson, on arrival in the United States, will proceed to Fort D. A. Russell, Wyo., for duty.

For the week ending February 21st:

First Lieut. Geo. D. Graham, February 10th, directed to proceed to Plattsburg Barracks, N. Y., April 18th, for temporary duty until June 30th.

L. B. Wright, ACT.D.S., February 11th, granted twenty days' leave and former order of December 20, 1913, revoked.

First Lieut. R. F. Patterson granted leave of absence for one month.

For the week ending February 28th—(No changes).

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY 1914.

February 3.

No. 1,086,006, to David Weiss. Tooth-brush.

February 10.

No. 1,086,508, to Daniel L. Chandler. Process of manufacturing tooth-brushes and bristle-holders therefor.

No. 1,086,659, to Frank Ferenc. Tooth-brush holder.

No. 1,086,887, to Walter H. Bittman. Dental handpiece-mirror.

No. 1,086,936, to Malcolm Pounder and Frank F. Hanske. Dental massage implement.

February 17.

No. 1,087,669, to Charles H. Land. Disinfecting apparatus.

DR. JOHN W. MOFFITT.

THE

DENTAL COSMOS.

VOL. LVI. MAY 1914. No. 5.

ORIGINAL COMMUNICATIONS.

STUDIES OF THE HUMAN MASTICATORY APPARATUS AND ITS RELATIONS TO THE PROSTHODONTIST, AND TREATMENT OF THE SAME.

By FREDERICK W. FRAHM, Ph.G., D.D.S.,

PROFESSOR OF OPERATIVE AND PROSTHETIC TECHNIC DENTAL ANATOMY; ASSISTANT TO CHAIR OF ANESTHESIA AND PHYSICAL DIAGNOSIS, COLORADO COLLEGE OF DENTAL SURGERY, DENVER, COLO.

(Read before the Denver Dental Association in October 1913.)

MUCH has been written and a great deal more said on this old and yet very new and vital subject. It is with a great deal of fear and hesitation that I take up its discussion, knowing full well that some great men have gone on before, setting up high standards. Still, the battle is on and I have entered it, striving for more efficient and scientific methods in the construction of dentures and bridges.

Far too long has been the time of waiting, and too great the inconvenience and suffering of a kind and enduring public, in the hope that the next new man in the field would be able to supply them with satisfactory and efficient substitutes for the natural organs that were lost through no fault or neglect on their part. Their teeth are gone, and what shall be done to replace these needed organs, and how shall it be done? A great deal has been effected, and more is being done at this time than ever before in the history of dentistry. The profession is awakening to its importance and is making wonderful advancement in the field of prosthesis. The manufacturers have also rendered us untold benefit by bringing out the anatomical teeth so much needed for this kind of work.

It is with thanks that my thoughts go back to the work that was accomplished by Drs. Bonwill, Walker, Snow, Gysi, and others who have done so much in one of the hardest fields of labor known to the profession. I owe some of these men a debt of gratitude I shall never be able to repay for having started me along the road toward more accurate and more scientific work in prosthesis.

THE INDIFFERENCE OF THE PROFESSION TOWARD PROSTHETIC WORK.

It is an acknowledged fact in our profession today that the making of dentures, no matter of what kind, is the bugaboo of nearly every dentist. Because of this dread, due in part to a lack of knowledge and more to a lack of proper equipment, this most difficult and all-important task, no matter from what angle it be viewed, is turned over to the commercial dental laboratory. Why?—and again, *Why?* Is it because we are lazy and do not like to soil our hands, or many other reasons I might suggest, including the mercenary one? How many times have we heard this quotation, "I know very little or nothing about plate work, and care less to know, when I can get the laboratory to do my dirty work for such a small consideration." Do these men ever think of the scientific problems that enter into the construction of dentures and large restorations by bridges? I think not. And it is in a good many instances only too true that they "know very little about plate work."

Every man owes it to himself, his patients, and the profession, to know all there is to be known about this all-important subject, to put into practice every new thought and theory, and to use the latest and best materials and the most accurate and scientific equipment that he can obtain. The time has long since passed when a practitioner could expect to attain success with a meager and ancient equipment. The public is demanding the best, and is willing to pay for it.

INDIVIDUALIZATION DEMANDED.

All the articulators up to the present time have been based upon the "law of averages." In their construction this law has never been lost sight of, thus assuming that all people were made according to a certain set of dimensions, and so all work done over these articulators was of an average, instead of an individual class. The day has gone by when we could be content to treat all cases according to the law of averages. A tailor or an oculist would not succeed in his work if he used this law; then why should the dentist expect to? It would be commercial suicide for the tailor and oculist. What will it be for the future practitioner of dentistry?

In our commercial enterprises, with their multiplicity of machines and perfected technique, the individual has been lost sight of to some extent; but not so when we come to the making of an appliance that is to replace the natural organs of mastication. Here it is that the individual asserts himself and has to be treated as such, for nature seems to have spent a good deal of time working out an overwhelming mass of varieties of all sorts; especially in human temporo-mandibular articulations and their relations. In fact, I might say that there are no two cases that present the same conditions or problem; each must be considered as to its own peculiarities and merits, if we would win success and have well pleased and satisfied patients. We are morally responsible, when we take hold of a case, to bring it to as successful a conclusion as could anybody else in that community. This is also required from a legal standpoint, leaving out the personal question entirely.

Dr. C. W. Benson of Duluth, Minn., in his recent paper, "What We Owe to Our Patients," says: "Since the advent of the anatomical articulator and face-bow, I have been especially interested in this work, for the theory of anatomical articulation, together with the means of carrying out this theory in a practical way, has seemed so thoroughly scientific and logical." This essayist is on the right track, and I dare say that success will crown his efforts if he will keep at the work; for it most certainly is both thorough and logical, as well as scientific and practical.

THE ATTITUDE OF STATE-BOARD EXAMINERS.

It is interesting to note the attitude of the various state boards of dental examiners in regard to this line of work. They have recognized the importance of

it, and are demanding from the candidates who present themselves for license to practice that they show themselves able to build a full upper and lower denture embodying the principles of correct articulation with the sixteen-tooth contact, which can only be obtained after a careful study of the relations and adapting them to the case in hand. The time is past when simple occlusion would suffice. This is a very healthful sign, and indicative of advancement and untold blessing to the profession and general public.

FIG. 1.

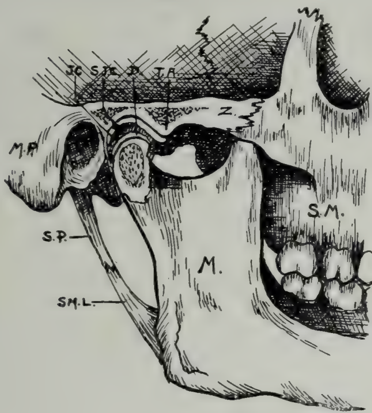


FIG. 2.

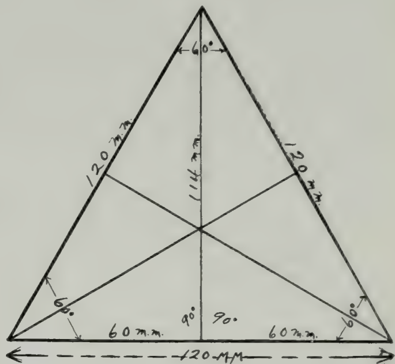
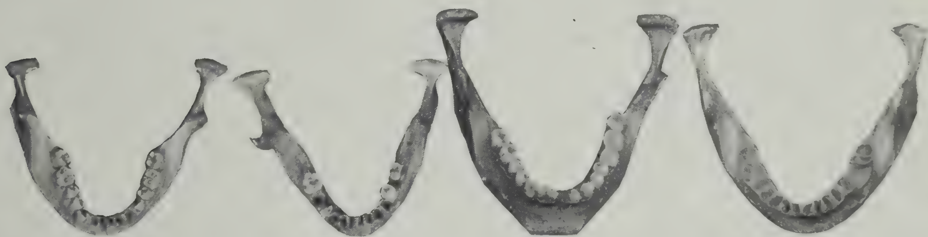


FIG. 3.



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THE LIMITED VALUE OF SUCTION DEVICES.

A good deal has been written and said about suction and suction appliances, and their usefulness to the prosthetist and patient. Many are the appliances that are on the market, and various are the claims for their retentive powers, the claimants seemingly forgetting the physical law that, at certain altitudes, we have certain pounds of atmospheric pressure, consequently only a certain amount of suction when all the air has been excluded by perfect adaptation. A dentist* in a recent issue of the DENTAL COSMOS advocates the use of alum in the patient's mouth, before taking the impression, to aid in the retention of the future denture, presuming that the puckering effect of the alum will render the parts smaller and harder. Other equally meritorious (?) methods are being advocated from time to time, some of which may be useful, but still remain

* See "A Prosthetic Use of Alum," by R. B. Moore, DENTAL COSMOS for November 1912, vol. liv, p. 1247.

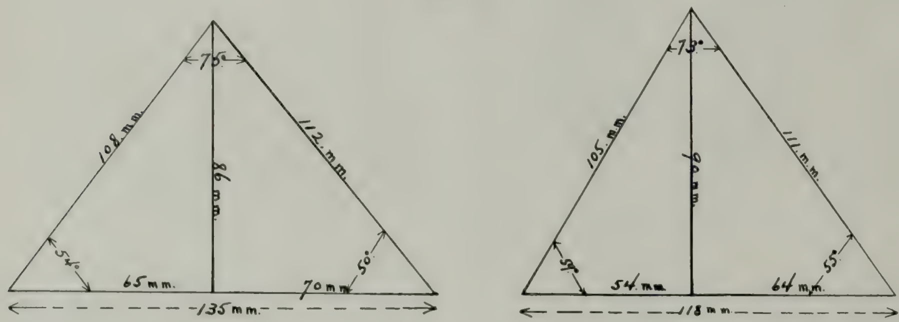
of questionable reliability. The fact remains that the making of a successful full upper and lower denture is a physical and geometrical problem. The laws that govern geometry cannot be ignored by the prosthetic dentist.

I might quote many men on the various phases of making dentures, and that with profit to us all. That, however, is not the purpose of this paper, and when I quote, it is for the purpose of comparison and study.

its long axis being directed from the medial side laterally and somewhat forward. The crest of this articular surface presents a form not entirely dissimilar to the German letter *f* lying flat, thus . This doubly curved line passes from the external part of this cylindrical portion to the internal part of the head.

The mandibular part is concave-convex from behind forward, and from the external to the internal border. This

Fig. 4.



(3) (4)

gives it the form both ways of the German letter *f*. This is due to the fact that this surface includes the tuberculum articulare (see Fig. 1, T.A.) which is clothed with cartilage. This articular cavity is divided into two parts, superior and inferior, by a disk of cartilage called the discus articulare (Fig. 1, D.). This disk is molded upon the head of the condyle, and aids in making up the inequalities that exist between the two articular surfaces of these two bones. The edge of this disk, being attached to the joint capsule (Fig. 1, J.C.) moves forward more or less as the condyle sweeps forward, owing to the action of the external pterygoid muscle, which has a few fibers attached to this capsule, while the rest are inserted into the neck of the condyle.

FACTORS ENTERING INTO THE CONSTRUCTION OF SATISFACTORY DENTURES.

I shall try to prove that *a perfect articulation according to individual measurements with poor suction will give better results than perfect suction with poor articulation and no measurements.* This may seem a rather strong statement to make, but nevertheless it is true, and has been proved by me many times.

To gain these results we must first study and consider well the human mandible and its movements, the muscles that control the same, the mandibular articulation, and the relation of the mandible to the inferior surface of the skull.

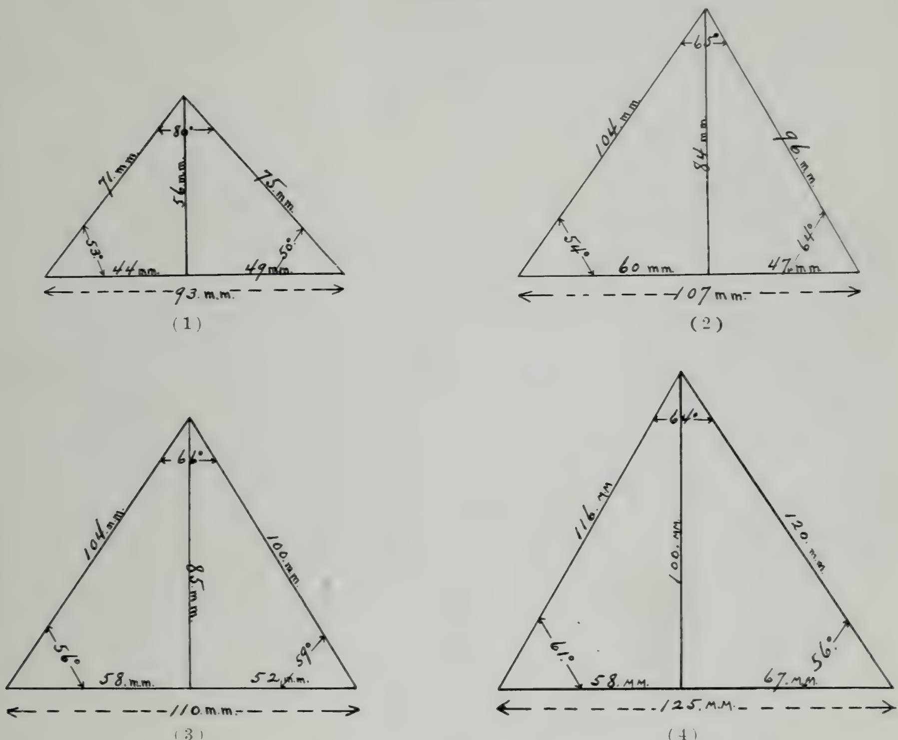
The mandibular joint. The mandibular joint represents an arthrodial diarthrosis, and occurs between the mandibular fossa of the temporal bone and the condyle of the mandible. These two articular surfaces are far from being similar either in size or shape. The head of the condyle is more or less cylindrical,

MOVEMENTS OF THE MANDIBLE.

The nature of the movements of the mandible is in part due to the location and action of certain muscles, and in

part to the shape and outline of the mandible itself. The mandibular joint influences it partly by the fact that these two joints may act simultaneously, independently or alternately. In fact, there is no other articulation in the human body like it, or one that will admit of as many movements. The disk that rests on the head of the condyle is a good deal thinner in its center than any other part, and is heaviest at its posterior portion, thus favoring the gliding as well as the pivoting action of the condyle. When the condyle moves forward on the left side, the teeth being in contact, it leaves the fossa along with the disk, until it rests upon the tuberculum articulare. During this movement the condyle head revolves in the concavity on the inferior surface of the disk; meanwhile the right condyle is simply revolving on the inferior surface of its disk, the point of axis being on the internal half of the condyle and the posterior crest of the concavity on the disk. This takes place when the act of mastication is performed on the right side. This action is just reversed when the patient masticates on the left side. It should be remembered that the disk at all times conforms very closely to the head of the condyle, and they move forward and backward together, but the disk does *not* revolve with the head of the condyle; neither does the disk in any way restrict the movements of the condyle.

FIG. 5.



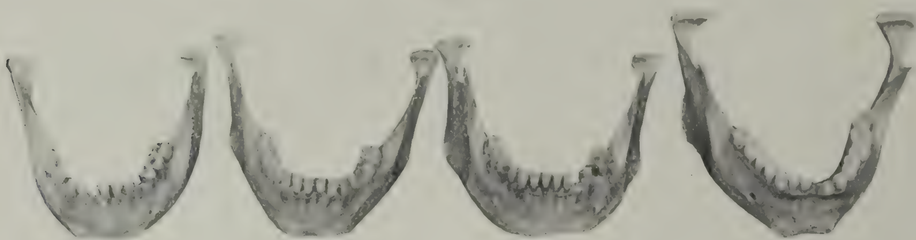
When the chin is depressed to a certain point, say one-quarter inch in the region of the incisors, the condyle simply hinges in the disk on both sides. During the extreme depression of the chin or the protrusion of the mandible, the disk together with the condyles moves forward in the fossa as far as the temporo-mandibular ligament will allow. When both condyles have moved

forward at the same time, a lateral motion or play can take place, owing to the fact that each fossa slopes inward with the transverse axis of the skull. This motion is reduced to a minimum, and sometimes is entirely absent, when both condyles are seated in the mandibular fossa.

The muscles controlling the movement of the mandible. The masseter, temporal, and part of the internal pterygoid muscles control the upward movement of the mandible. Without the internal and external pterygoid muscles, we could have only an opening and closing movement of the mandible, with the simple occlusion of the teeth. The digastric and hyoid muscles aid in depressing the mandible and holding the chin back, thus in part overcoming the action of the pterygoids in their lateral and protruding action.

The internal and external pterygoids have a common origin from the pterygoid plates of the sphenoid bone, though a few fibers of each take a different origin near-by; still, for our purpose, they come from practically the same area of the skull. The external pterygoid is inserted into the neck of the condyle, while the internal pterygoid is inserted into the triangular depression on the mesial surface of the mandible near the angle. Thus it will be evident that, when these two muscles act alternately, a seesaw or oscillating movement of the ramus is produced, while the chin moves along a cavo-convex line. This movement is aided by the presence of the stylo-mandibular and spheno-mandibular ligaments (Fig. 1, S.M.L.). This seems to give the mandible, when in extreme action, a new point of axis somewhere between the condyle and the angle. This cannot be called the hinge point, nor can it properly be called the point of rotation, for it is of too shifting a character, being almost entirely due to muscular action and the triangular relation found between the ramus and the origin of the internal and external pterygoid muscles. I prefer to call it "the shifting axis." It is of very little moment to the prosthodontist except that he should keep in mind where it is, and not confound it with the other two points of movement of the mandible.

Fig. 6.



(1) (2) (3) (4)

This shifting axis is very evident when the mandible is depressed as in the act of yawning, or biting into an apple, while in the ordinary incising movements, and during the trituration or the mastication of food, when the teeth in the incisal region are separated not to exceed from one-eighth to one-quarter of an inch, this forward sweep of the condyle does not take place; it simply works as a hinge joint. When the pterygoid muscles on one side only are contracting, thus forcing that side of the mandible forward, the opposite side rotates on a point posteriorly and internally to the center of the head of the condyle. This rotation point is always found on the condyle during real mastication; it may vary according to the type of the individual and the relation that the ramus bears to the plane of occlusion, while the distance from the external part of the condyle remains the same. Dr. Kerr's method is based on this assumption.

The mandible and its relation to the

inferior surface of the skull. Nature always tries to bring about harmonious results, no matter what the difficulty may be. If there is a lack in some part or portion of the anatomical arrangement, a compensation is effected somewhere else in an effort to overcome this lack of proper development. This is particularly true in the relations that exist between the mandible and the inferior surface of the skull. It is not always our privilege to be able to explore these regions, and when we can, the patient has no need for our services. But in the living subject we have certain points and lines that we can use for foundations; then with the proper instrument and technique we may get an exact picture of the field. If there happens to be an under-development of the two superior maxillary bones, we usually find a compensation in the mandible and its relation to these parts, so as to conform and produce an articulation that will be of use to the individual, unless the problem is too extreme.

FIG. 7.

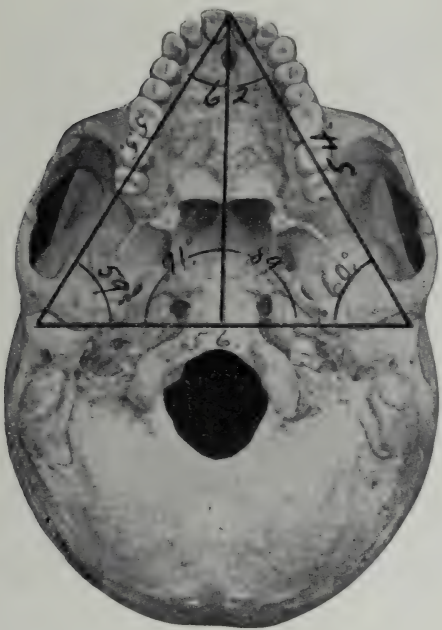


FIG. 8.

So with the work of the prosthodontist: If only such cases came to him as were normal in every respect before the loss of any or all of the teeth, his work would not be such an exacting and difficult task. He then might be somewhat excused for assuming that the relations of the parts are so nearly uniform that he might work upon the law of averages with some hope of achieving success.

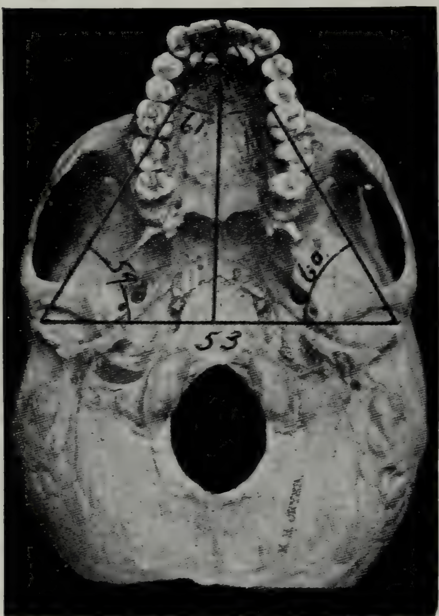
Since this is not the case, and nature seems to take special delight in producing varieties, no two cases presenting the same conditions, though there may be a feature or two that may be found in common in several cases, it still leaves the prosthodontist with the necessity of treating each case individually, making and recording measurements for each, and constructing his artificial substitute according to these findings. Anything short of this is not scientific or just to the patient.

It is usually the most abnormal cases that lose the teeth at an early age, thus requiring the artificial substitute. Right here I am frank to confess that these cases are not easy ones to deal with. There seems to be nothing that is so harmful to the masticatory apparatus

as under-development with malposition of the teeth, entailing in its path decay, pyorrhea, and the early loss of the teeth. It is in these cases that we are called upon to produce perfect relation and articulation, and try to bring about as normal conditions as possible. And such a problem is surely worthy of the best effort and mettle of any man.

I should like to dwell at length upon this one phase of the subject, but shall

Fig. 9.



take up some other points equally important, if not more so.

BONWILL'S EQUILATERAL TRIANGLE AND ITS UNTENABILITY.

It was about 1897 or 1898, that Dr. William G. Bonwill of Philadelphia put forth the theory that upon joining three points of the mandible by straight lines drawn from condyle to condyle and from each of these to a point between the central incisors, an equilateral triangle was formed. In the September 1899 issue of *Items of Interest* can be found his last article setting forth this principle. As he died in the same month, the profession was denied any further thought by this eminent man.

Dr. J. E. Schaefer of Chicago, in commenting on this theory, says—"While Dr. Bonwill's conception was too idealistic, he nevertheless laid the foundations of our present understanding of anatomical articulation." I agree with Dr. Schaefer in that Dr. Bonwill laid the

Fig. 10.

foundations, but not that he was too idealistic, for Bonwill's ideal, if it may thus be called, has been passed for higher ones long since. The ideal that we should all aspire to is a perfectly articulated case for each individual according to measurements and peculiarities. I do not think this ideal too high, neither is it unattainable. I am sure that we as a profession are reaching for even higher ideals, and shall attain them.

It is no state secret that those text-books on prosthetic dentistry that are over ten years old have lost their value save as books of reference or history, so rapid and radical have been the changes in theory and technique. The practi-

tioner who does not attend the society meetings and read the current dental magazines will in a few years be outclassed by his more up-to-date brother.

Bonwill, after much investigation, came to the conclusion that the mandible was an equilateral triangle, with an average base and legs of four inches or about 100 mm. This would mean that the points of each angle would be 60 degrees, and that the perpendicular with the base on each side would be 90 degrees. (See Fig. 2.) If such were the case, our work would be comparatively easy. Unfortunately such does not happen to be the case; on the contrary, there is no such equilateral triangle. It may be found in a few cases to be an isosceles triangle, but in over 90 per cent. of human mandibles, we note a *scalene* triangle having the three sides unequal.

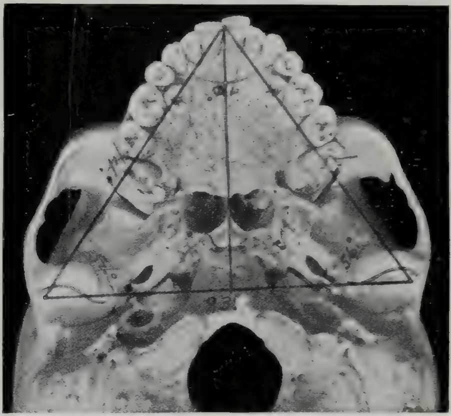
THE WRITER'S OBSERVATIONS ON THE ISOSCELES MANDIBULAR TRIANGLE.

I have come to this conclusion only after examining many skulls in the laboratory, and many clinical cases. Neither do I deem it expedient to use the base line from condyle to condyle as the foundation line. Should I do so in the case of Fig. 3, Nos. 1 and 2, what kind of a triangle should we have? If we draw a base line from condyle to condyle, and the perpendicular at right angles from the center of this line, the point of the isosceles triangle would be found somewhere on the mesial inclined plane of the left canine in mandible No. 1 and between the left lateral incisor and canine in mandible No. 2. This would also appear with a good deal more force on the inferior surface of the skull, for here we have the suture between the right and left bones, extending from the foramen of Scarpa to the foramen magnum. As this line is always found in the center, and can be relied on for stability, I shall use it for the foundation line, basing all my triangles and measurements on it.

It was my privilege to measure a great many skulls and study their articulations during my three years' studies at the University of Iowa. Never thinking that I might want records or photographs, I neglected to make any. I have been privileged to supplement these observations and measurements during nine years of work on patients both in private practice and in the infirmary of the Colorado College of Dental Surgery of Denver, Colo.; so when I state that the mandible in 90 per cent. or more cases is a scalene triangle, I am not wholly without proof.

The seven drawings of triangles—Fig. 4, Nos. 3 and 4; Fig. 5, Nos. 1, 2, 3, 4—

FIG. 11.



were made from measurements taken of the mandibles found in photographs Figs. 3 and 6, bearing the numbers mentioned above. Fig. 2 is not a measurement of a mandible, but is simply introduced for the sake of comparison.

It will be noticed by a study and comparison of these drawings that not one can be called an equilateral triangle. They are all on the scalene type, with the foundation line to one side or the other of the center of the base line. The difference in their sizes also should be noted, not one of them having been taken in a subject under sixteen years. These sizes are to be kept in mind while we look at the photographs of these bones, Figs. 3 and 6. They bring out the comparison in size and shape very nicely. Special attention is called to Fig. 6, Nos. 1 and 4: No. 1 shows a mandible in which the

right third molar is just erupting. It should be compared with No. 4 of the same cut, No. 4 being a very ordinary-sized mandible, measuring $4\frac{1}{8}$ inches from condyle to condyle. The four mandibles in Fig. 3 should also be studied, noting the irregular positions of the condyles in relation to the median line of Nos. 1 and 2. All the figures found in these drawings of triangles represent actual foundation and leg lines. It is to be remembered, when examining these cuts, that the figures on the lines are only for comparison, and do not represent the actual sizes of these skulls, it not having been my privilege to measure them. The angles in degrees are as correct as a protractor can make them. In all of the cuts of the inferior surface of the skull, the perpendicular or foundation line has

Fig. 12.

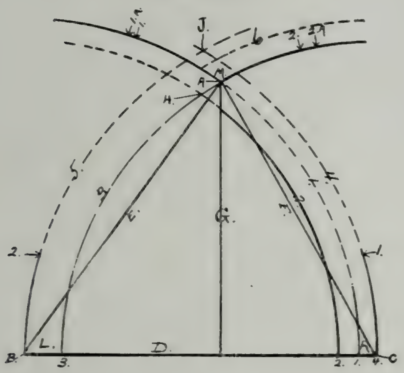
measurements in millimeters, and the degrees were obtained with the best protractor that money could buy.

By the kindness of Dr. M. H. Cryer, I am permitted to use some of his figures to aid in illustrating the point of argument. These are numbered from Fig. 7 to Fig. 12. In looking these over it will be noted that Fig. 7 is the nearest to forming an equilateral triangle, though really it is an isosceles triangle. The remainder are of the scalene type, with the exception of Fig. 9, which belongs to the extreme prognathous jaw and is rarely met with. It must be classed with the scalene type with long been drawn through the suture formed by the junction of the right and left halves.

It is very interesting to study the relations that the dental arch bears to the leg lines of the triangle, noting especially the location of the last tooth in the arch on each side. Fig. 10 shows the skull of a very young person, perhaps not more than six years of age, as the first permanent molar is just appearing; still it will be noted that the leg lines on both sides pass through the central fossa of each tooth. The same condition will be found in Fig. 7, in which case the last tooth happens to be the third

molar. This is as it should be. No matter of what type or size the triangle, or what angle the leg lines bear to the base, the last tooth on each side should be crossed by the leg line in order to give the articulation the proper balance. Thus, when the mandible is of a

FIG. 13.

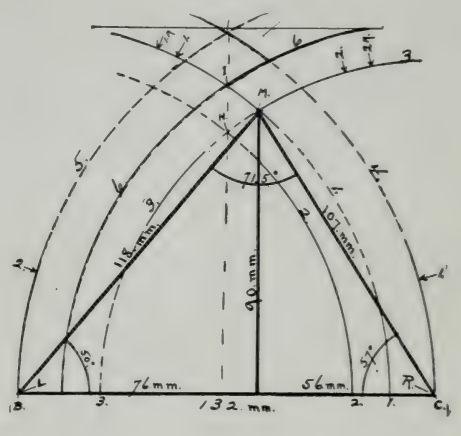


strong scalene type (Fig. 3, No. 1), if we should attempt to fit this case on an equilateral or even on an isosceles triangle, we could never hope to obtain satisfactory results. Likewise, if the perpendicular line were moved as far to the left as it now is to the right, our difficulties would be multiplied.

It will be noted from looking over the cuts of the inferior surface of these skulls, that nature, though hindered in doing her work, tries to arrange the teeth to conform to each individual and peculiar triangle, though this sometimes results in the malformation of the dental arch, and that even to the extent of placing teeth outside of the arch. (Fig. 11.) We cannot get away from the fact that the arrangement of the teeth in the arch, the shape of the mandible, and its relations, involve certain physical and geometrical problems. So, then, we cannot and dare not ignore them without detriment to the work. We must *solve* them.

When a given triangle is rotated, using one of its points as a pivot, the other two points will pass along arcs of circles of different sizes, and each point travels an individual distance, which is governed by the length in the line and the degrees which it bears to the intersecting line. These arcs of circles must govern the prosthetist in the arrangement of the arch of teeth. Fig. 13 gives a good illustration of the arcs of circles, their

FIG. 14.



path, and the distance that each point moves along the arc, as found in a scalene triangle.

This chart (Fig. 13) is an analysis of the mandible Fig. 6, No. 1. If the condyle on the left side (L) remains in articulation and is allowed only to rotate, and the right condyle to sweep

FIG. 15.

forward along the arc 4, we would miss the median line (M), for the legs of this triangle are not of the same length. So we start with a new circle at point A, following out the solid part of arc 1, which is smaller than that of No. 4. Thus, when point C travels to arrow No. 1, point A will travel to arrow No. 1, the distance being shorter by the difference between arrow 1 and 1A on arc 1.

The arc drawn from point A, using B as the pivot, would bring the arc 1 to an intersection with the base line at point 1; it would be at point 2, if this were an isosceles triangle.

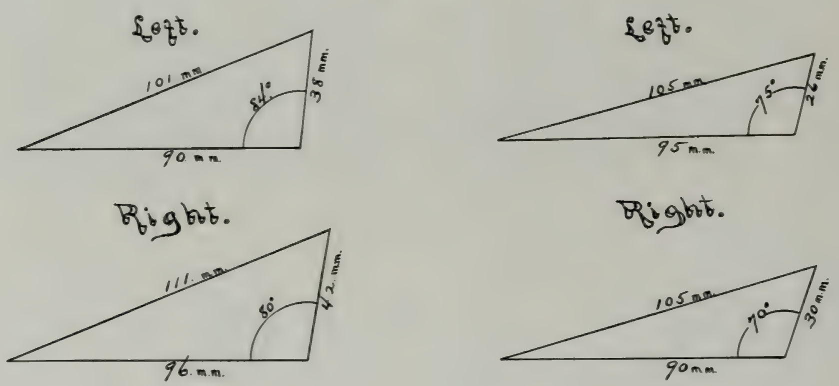
Using point C on the right side for a pivot, the left side, point B, would move forward along arc 5, while point A travels along arc 3. If point B travels to arrow No. 2, point A moves along arc 3 to arrow 2, the difference in distance being from 2 to 2A on arc 3. If we describe an arc on the right side to correspond in size to arc 3, we would get arc 2 with the intersection at point H, which would throw the median line and suture G to the left. If we describe an arc on the right side to correspond to arc 5 on the left, we would get arc 4 with the intersection at point J, placing the median line too far forward, giving us a prognathous type. This latter point J, with points B and C, forms an equilateral triangle.

We could analyze every skull and chart in this series with a great deal of benefit, but will use only this one for an example, it being an average case.

PRACTICAL SIGNIFICANCE OF GEOMETRICAL OBSERVATIONS.

One may wonder, and ask, Of what benefit is all this analysis to the prosthodontist in doing his work? I wish to call attention to Figs. 7 to 11 for a short study. A great deal might be said of each one, but we shall touch only a few points. By comparing these cuts and the triangles upon them, it will be noted that no two are alike, one being an isosceles, and the others scalene triangles. No matter how long the base line, or how short the perpendicular line, with all the variations in the leg lines, it is noted that nature labored hard to keep the arrangement of the teeth in the arch to conform to these various triangles. May I ask, Shall we do any less? Shall we not take these into consideration? We surely cannot afford to do any less; we ought to do as much.

FIG. 16.



(3) (4)

Fig. 7 is nearly perfect in arrangement, though it is not what we might call idealistic. If no hindering influences develop in the case of Fig. 10 to divert nature in her work in such a young subject, a case like this would expand and keep the type of triangle and arrangement of teeth to conform to it.

In Fig. 11, nature was hindered in developing the arch, and as a consequence omitted two bicuspids, one on each side, nevertheless sustaining the type of triangle to which this skull belongs. Fig. 9 comes as near to forming an equilateral triangle as any skull in the series, but would not be so if the two laterals were in position. At best this skull is distinctively of the prognathous type. The

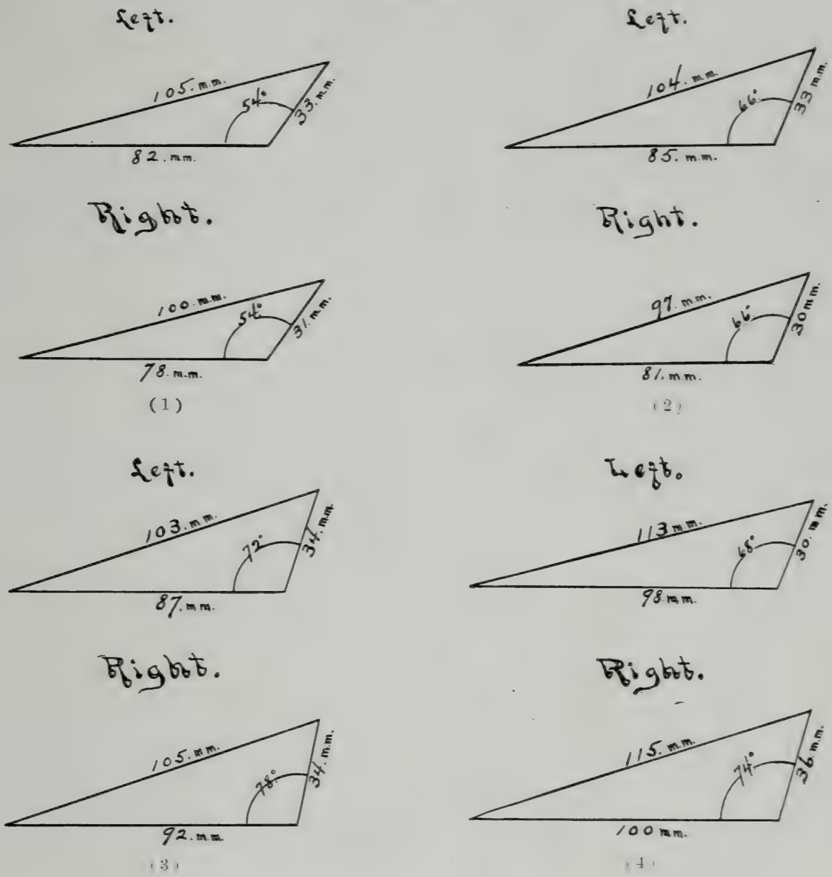
arch in Fig. 9 is constricted, giving a high vault.

All the line figures found in Figs. 7 to 12 are only of value for comparison, as they do not represent exact or given lengths in millimeters. The angles recorded are correct.

the mandible is in motion, and the angle this line forms to the plane of occlusion.

These, as a rule, are not the same on both sides in any individual, for the length of the ramus varies. It is almost needless to state that this condition pre-

Fig. 17.



In considering the lateral movements of the mandible, several other factors enter into the question, aside from the inclination of the condyle path, as is seen in the mandibular fossa. These factors are the position of the perpendicular or foundation line with the base line, the distance from the plane of occlusion where this line crosses the posterior to the point of articulation, or that point of prominence on the condyle that can be felt with the finger when

vails among all human beings, no matter of what type or species. It is also an uncommon condition to find that both sides present the same measurements.

PROCEDURE IN MAKING MEASUREMENTS.

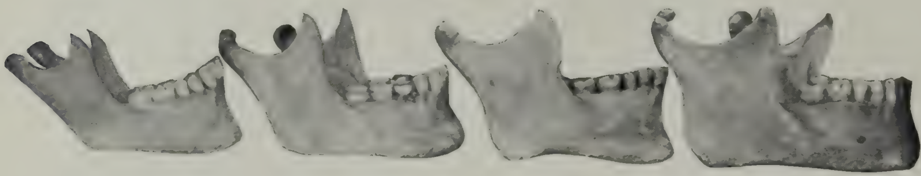
These measurements are easily made. First the prominence on the condyle is located, then it is marked when the mandible is at rest, and the plane of occlusion is located and followed out to where

such a line would cross the posterior border of the ramus; next a line is drawn from the condyle to this intersection. Now a line is drawn from the condyle point to the median point on the plane of occlusion; this latter line will be the same as the right or left leg line of the other triangle, depending on the side on which we are working. Fig. 12 illustrates this.

are of no real value in the trituration and mastication of food.

When the teeth are opened less than one-quarter inch, the inclined planes and depths of the sulci of the teeth enter into the question, together with the inclined plane of mandibular fossa and disk. In Fig. 15 is represented a combination of triangles arranged as they existed in a mandible that I examined.

Fig. 18.



(1) (2) (3) (4)

We now have all three triangles in mind and our eye on the palatine suture or foundation line, for that is the real center and seems to be the pivotal point or shifting axis between the two sides, due in part to the alternate action of the right and left pterygoid muscles. If this foundation line is to right of the center of the base line as in Fig. 14, and the distance from the condyle to the plane of occlusion is different, we must of necessity have arcs of two different circles. (See Fig. 15.) This condition might lead one to believe that there are two widely different points of rotation, but this is not the case, they being entirely due to the difference in distance from the condyles to the foundation line, and the action of certain muscles when the teeth are opened more than one-quarter inch in the incisal region, and

It shows the foundation line with a segment of a circle from each condyle to this line. By a careful study of this figure the point of my argument can be readily seen, and if I could only show in connection with this the hinge and rotation points, the whole situation would be grasped in a moment.

Assuming that we have unequal distances from either condyle to the plane of occlusion and from there to the foundation line, if we now rotate this series of triangles on one condyle point or the other, the plane of occlusion on either side will pass along arcs of circles of different size, thus necessitating a different incline for the occlusal surfaces of the bicuspids and molars on each side in order to sustain the proper balance of our work.

Fig. 19.

(1) (2) (3) (4)

I would like to urge a careful study

of the series of drawings in Fig. 16, Nos. 3 and 4, which represent measurements of bones Nos. 3 and 4 in Fig. 3. Fig. 17, Nos. 1, 2, 3, 4 represent exact and faithful measurements of the bones found in the photograph Fig. 18. By observing the bones in Fig. 19, it can be readily seen that the distance of the plane of occlusion to the condyle is far from being uniform, and that the size of the bone does not govern it, No. 1 being far smaller than No. 4, though the distance from the condyle to the plane of occlusion is greater.

As to the causes of these variations that exist in the human masticatory apparatus, they are manifold, and it is not my purpose at this time to speak of the etiology of these cases, for I am at this time dealing entirely with the mechanical side of the question and shall simply mention a few of the factors that enter into its etiology, namely, hereditary, muscular, traumatic, and pathologic influences. These may be subdivided, giving specific forces under each head which would exert an influence such as to leave lasting conditions that could not be overcome or modified, but must be treated with an artificial substitute to harmonize with the existing conditions.

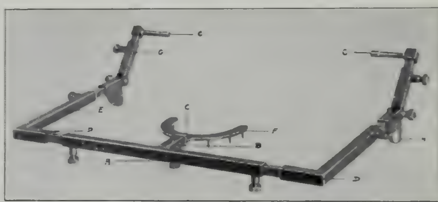
As was stated in the earlier pages of this paper, a perfect articulation in accordance with individual measurements with poor adaptation or suction will give better results than perfect adaptation with poor articulation and no measurements.

With this statement in view, I do not want it understood that I would not require a faithful reproduction of the parts to which the denture is to be fitted. On the contrary, I want the best cast of the case that is obtainable. On these should be built the two bite-plates, using the Perfection or the Ideal base-plate, building out the ridges and contour to restore the features and expression as the case requires, keeping the junction between them at the lip line when it is at rest and in line with the plane of occlusion on both sides. They should also be so built that they will approximate evenly one above the other during the normal position of the mandible when at rest in the mandibular articulation. Having attained this, we are now ready to make the various measurements.

In order to limit the length of this paper and not fill it up with technique that is known to every prosthetist, I omit a good deal of the detail technique that can be obtained from text-books and current dental journals.

The "face-bow." Fig. No. 20 shows the compensating face-bow with the several arms partly extended, to show where it is adjustable, also that the adjustments are scaled in millimeters. Arm G travels over a dial H, which is scaled in degrees. All the adjustments are held by screws conveniently placed. When all the arms

FIG. 20.



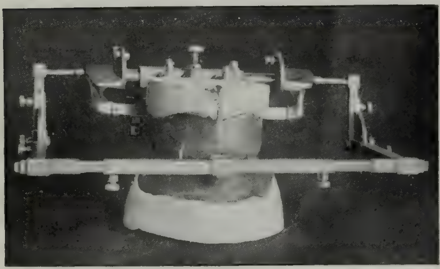
are closed, and arm G is extended to an angle of 45°, the distance between the points C are equal, this triangle being as small as will ever be required by any case. Arm B is the foundation arm, and the arms D and E can be moved independently to any distance required by any case. The short arm G also can be lengthened so as to place the pointer C on the prominence of the condyle. They also admit of being set at any angle as indicated on dial H.

Since each arm works independently of the other, and A and B are the only fixed parts, one can measure and record any form of triangle that a case may present. We shall also know the exact distance in millimeters between the two condyles, from condyle to the plane of occlusion, and the angle which the ramus forms with this plane, the distance of each condyle to the foundation line, and the length of the foundation line. Thus we can construct any and all of the three triangles discussed in this paper.

THE TECHNIQUE.

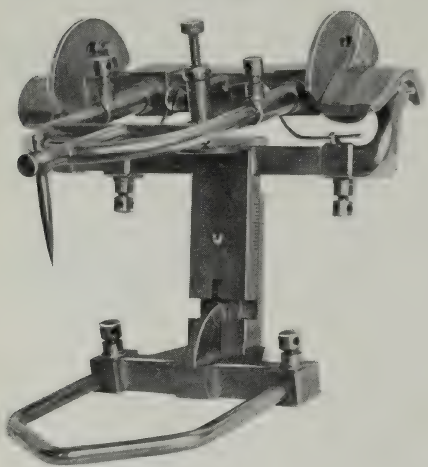
The mouthpiece A is equipped with thorns on the under surface that can be forced into the wax bite-plate. The arm on A that extends into arm B is used

Fig 21.



as a guide to aid in properly placing the mouthpiece. When the two bite-plates have been properly trimmed to conform to the desired outline they part at the lip line when it is at rest, and follow the

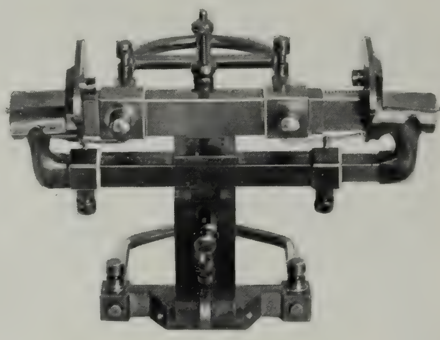
Fig. 22.



plane of occlusion. Then the prongs are forced into the lower bite-plate, when it is in position in the mouth, keeping the arm of the mouthpiece A in line with the palatine suture, thus insuring its being in the center and parallel with the foundation line of the triangle. It should be forced down evenly on the wax so as to keep it with the plane of occlusion.

The prominence of each condyle is located when it is in position at rest in the articulation, and marked on the face; then the upper bite-plate is introduced and stapled together. Having extended the various arms of the face-bow so that it can be placed into position on the patient, we now place the bow on the arm of the mouthpiece, moving it up to the wax. The arms D are closed up and the arms E and G lengthened, adjusting the angle of the arm G so that the pointer C will cover the point marked on the face for the location of the condyle, remembering that the arms E will be parallel with a line drawn from the floor of the meatus, past the ala of the nose. This is done on both sides, remembering that the one may be entirely different from the other. Having made the measurements as indicated in Fig. 25, it is well to record them for each patient in a book

Fig. 23.



reserved for that purpose, so as to have them for future reference and use. Thus we can measure any number of patients with the same face-bow, coming back to each case as is desired, reset the bow to the measurements that were taken, replace the A to which the bite-plates are still fastened, adjust it to the articulator, and mount the cast. (See Fig. 21.) If we wish to be able to manipulate a number of cases at a time, all that we

need is as many extra mouthpieces as we desire, and number them properly.

The writer's articulator. Having obtained accurate measurements and ascertained the peculiarities existing in the case, we should have an instrument that will conform to these measurements and retain them in every detail. These requirements are fulfilled in the articulator shown in Figs. 22 and 23. It is so constructed that it can be set to conform to the same measurements that have been obtained with the face-bow and recorded for the patient. The adjustments are all made on a millimeter scale, and each side works independently of the other. The center of the instrument, corresponding to the foundation line of the triangle and the mouthpiece of the face-bow, is at the point of the adjusting screw which acts as support to the upper bow, keeping this part of the articulator in relation to the rest. The back piece is milled, the two parts sliding in each other, thus allowing it to be extended or shortened to meet the measurements recorded by the pointer arm G of the face-bow. The back can also be inclined to any angle and locked, to correspond to the angle of the ramus with the plane of occlusion. The lower cross-arm carries the bow for the lower cast, and the dial shows the degrees of the angle. Fastened to the upper part of the back is the cross-arm from which extend the natural condyles, the sliding arms of which are held in position by screws.

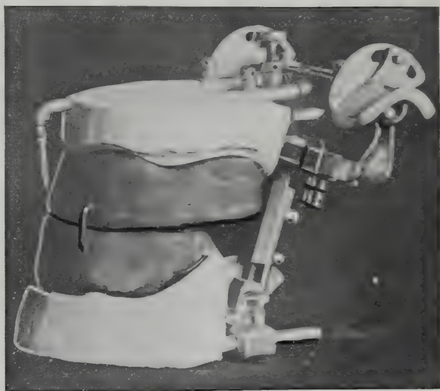
The upper part of the articulator carries the two adjustable mandibular fossæ, the adjusting screw, and two long sockets into which the bow that holds the upper cast may slide. The arms that hold the adjustable mandibular fossa have an indicator that records on the back the distance that each one is being extended. Each mandibular fossa can be tilted to the required inclination that the condyle path of the case demands, and is then locked with screws.

The upper-cast bow sets in two sockets that admit of its being moved forward corresponding to the length of the arms E of the face-bow, the indicator maintaining the upper portion of the foundation line and the point to which the wax bite-plates should be brought with the median line at this indicator.

There is no mechanical union between the upper and the lower parts of the articulator. These are held in relation to each other simply by a spring, thus imparting to the articulator the peculiar swing that the mandible possesses, without any mechanical interference or hindrance.

Last but not least, by using the natural condyle traveling in its natural mandibular fossa, we have both the hinge and the rotation points, together with the lateral swing. These three features, together with the spring union mentioned above, constitute an adjustable mechanical device capable of imitating the human masticatory apparatus in each and every case, and capable of reproducing each and every peculiarity.

Fig. 24.



Technique of use of the articulator. After the bite-plate with its respective mouthpiece has been placed in arm B, and the other adjustments of the face-bow have been made according to the records of the case, we adjust the articulator to these measurements, and place the face-bow pointers on points to catch on the condyles of the articulator, and mount the casts as seen in Fig. 21. The face-bow and mouthpiece are removed, and the wax plates restored to their former outline, if they have been marred in this operation. All screws should be

firmly set. To obtain the incline plane for the articulation, we place a wax cone as near the heel of the lower bite-plate as we can. The two bite-plates are introduced into the mouth, and the patient is instructed to protrude the lower about one-quarter of an inch, being sure that

Fig. 25.

this takes place on both sides. This can be done by observing the median line, noting that one is directly above the other. The patient is now requested to close the jaws until the two bite-plates are in contact in front; they are stapled together firmly, and removed together, then replaced upon the mounted casts, extending the lower as far as necessary, and adjusting the mandibular fossa on each side to conform to this measurement, and locking them with the screws. (See Fig. 24.)

By observing Fig. 21, which shows the face-bow in position and the casts mounted, it will be seen that the casts are far from being in the center between the two articulations, and it will be noted that the case belongs to the scalene type of a very distinct character. The distance from the foundation line to the left condyle measures 76 mm., and that from the foundation line to the right condyle 56 mm., the length of the foundation line being 90 mm., and the distance from the point of the condyles to the plane of occlusion being 34 mm. at an angle of 80°. The right condyle path is 45°, and the left is only 40°. Still, as will be noted in Fig. 25, this is a very ordinary case—one that could be dealt with in almost any way with good results. I have emphasized before, but think that it will stand repeating without any loss of force, that each and every case is peculiar and presents problems all its own that must be solved individually. I think there is no other face-bow and articulator at this time that will admit of the adjustments necessary to bring about the results that were obtained in this case.

It might be of interest to know just what this case would look like if it were reduced to exact measurements and the arcs and triangles were made and analyzed. This has been done in Fig. 14, where the photograph of the patient and the triangles analyzed can be compared, showing that what seems to be a very ordinary case is in reality quite an extraordinary one.

SOME TECHNICAL SUGGESTIONS ON THE TREATMENT OF MALOCCLUSION, USING THE NEW APPLIANCES OF DR. E. H. ANGLE.

By E. SANTLEY BUTLER, D.D.S., New York, N. Y.

(Read before the Alumni Society of the Angle School of Orthodontia, New London, Conn., July 1913.)

WHEN Dr. Angle gave to the profession his new appliances and taught the technique of their application by clinics held at our last two meetings and fully described in the DENTAL COSMOS for August 1912 and January 1913, he placed in our hands the most efficient appliances ever given to orthodontia. The more one becomes accustomed to their possibilities, the more will he abandon the old expansion arch.

The lectures on "Bone Formation" given before the last class of the Angle school in 1911, by Dr. F. B. Noyes and Dr. Albin Oppenheim, called attention to the careful study of "mechanical stimulation" in regard to physiological bone growth, and from mere mechanical movers of teeth we orthodontists have become "bone-developers" in a truly physiological sense—the .030″ diameter gold-platinum arch-wire, with its gentle yet positive pressure, supplying just the necessary stimulation.

PLAIN BANDS.

The technique of the application of plain bands to the teeth must positively mean their close adaptation to the tooth form, in every possible case pinched with Dr. Angle's band-forming pliers on the lingual surfaces of the teeth; this gives a smooth labial surface for the soldering of the arch-pin tube and strengthens the band on the lingual surface. The band material should be made from precious metals, for, while using an arch-wire of gold-platinum alloy, any base metal used in the mouth at the same time will produce an electrolytic action that will tarnish the gold or platinum appliances. How are we to ask our patients to be particular about cleaning the appliance, if we send them out of the office with that same appliance tarnished and dirty, or liable to become so in a few hours? The writer prefers a band material of platinum alloyed with from 7 to 10 per cent. iridium, rolled to a thickness of .003″ and cut in widths of .21″, .19″, and .16″, to be used with arch-pin tubes of .15″, .13″, and .10″ in length respectively. This width of material allows for festooning the band (see Fig. 1) so that the band just passes under the gingiva; this edge should be beveled and thoroughly burnished to the surface of the tooth.

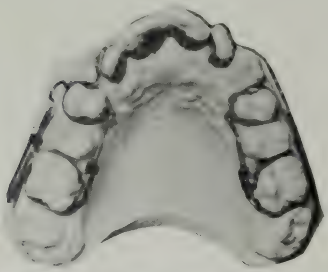
FIG. 1.

From a prophylactic point of view, the band must cover the crown of the tooth to the gingiva, or we surely will have etching and caries from disintegration of particles of food that will lodge between the end of the tube, pin head, and enamel of the tooth surface. This consideration has appealed to me so positively, that I have replaced all of my bands, originally made of narrow band material, with wider bands protecting the tooth surface.

ARCH-PIN TUBES.

In soldering it to the band, the tube should be placed in nearly all cases in

FIG. 2.



Technic model—occlusal view.

the center of the crown, parallel to the long axis of the tooth and at such a distance from the occlusal edge that there is room for the arch-wire to rest upon the band material. Teeth that are in torsion call for the tube to be placed as near to the point of rotation as possible (see Fig. 2), so that we can have the full leverage of the arch-wire for rotating. Arch-pin tubes should be used in such lengths that the occlusion is not interfered with, nor the gingiva disturbed. Lengths of .15″, .13″, and .10″, I find, will answer all practical purposes. In Fig. 3 tubes of .15″ are used on the upper centrals, and .10″ on the laterals; owing to the long overbite, all the six anterior lower teeth have tubes .10″ in length.

Care in selecting the proper width of band material, arch-pin tube and pin, and having the occlusal margin of all bands on the same plane, will produce a more artistic and less conspicuous appliance. (See Fig. 4.)

FIG. 3.

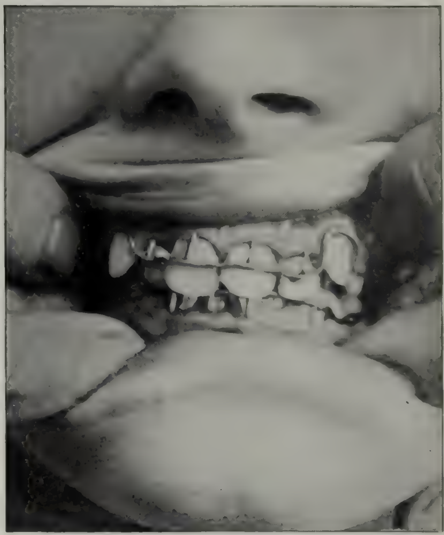
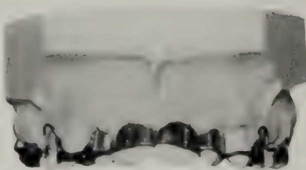


Photo of appliance in mouth. (R. F.)

FIG. 4.



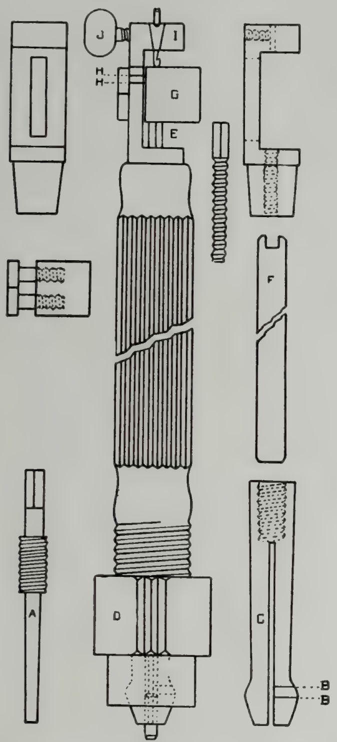
Technic model—front view.

DOUBLE-ENDED JIG FOR UNIFORMLY SHORTENING ARCH-TUBES AND PINS.

To make shorter tubes, I have devised an instrument (see Fig. 5) accurately to cut down to the required length the .15″ tubes supplied to us. To adjust the tube end, the gage A is screwed up to the marks B B, on the side of the jaw section of the vise C, making the tubes .10″ and .13″ respectively; section C is replaced in the handle and the nut D is screwed up. The arch-tube is dropped

into the chuck, which is tightened, and the projecting portion of the tube is filed off flush with the jaws of the chuck, then with a reamer the bore of the tube is smoothed.

FIG. 5.



Drawing of tube-reducing jig.

ADJUSTING THE PIN END.

Gage E is adjusted with the wrench F, so that the face of slide G is continuous with the gage-marks H H on the side of the jig, making pins of .10″ and .13″ respectively. An arch-pin is then inserted, with the crescent end in proper position, into the vise I, the thumbscrew J is tightened, and the projecting portion of the pin is filed off flush with the jaws of the vise. Then with a .30″ gage fine-cut joint file the crescent end is filed on the cut portion of the pin, using the grooves on the side of the vise as guides. To release the pin, the thumbscrew is unscrewed and the slide G is pushed forward.

CEMENTATION OF BANDS.

So much depends on the thorough cementing of bands with these appliances, that every care should be taken with this part of the operation. Before pinching a band, the band material is drawn, on the side that is to be in contact with the tooth surface, over a rat-tail file, which roughens it, for the sake of better adhesion of the cement. After the band is properly fitted and polished, a small piece of base-plate wax is pressed into the arch-pin tube; this will prevent cement gaining access to the bore and hardening in the tube. Care must be taken that the tooth has been thoroughly polished and cleansed just before cementing any band; this can be best done by the use of pumice, orange-wood points, and ribbon floss. After cementation the band must not be disturbed until the next sitting; one should plan beforehand which teeth are to be banded, and then finish that part of the work, before attempting to fit the arch-wire or arch-pins.

ARCH-PINS.

The pins as supplied by the manufacturer come to us bent at an angle, so that they will lock when pushed into their respective tubes; this seems rather impracticable, as a few withdrawals from the arch-tube will straighten out the pin; also, the continual unlocking injures the delicate catch on the pin head. While this bent pin may be right for cases where there are only two pins to be fitted, yet in cases in which there is a multiplicity of pins to be fitted, the unlocking of each pin as its neighbor is added to the arch-wire wears out this delicate hook. Straight pins can each be fitted and withdrawn any number of times, and when all the pins are attached to the arch-wire, and it is ready to go into place, they can be bent to a proper angle to lock, by using a pair of contouring pliers, S. S. W. No. 137.

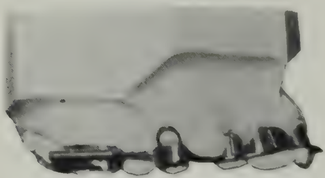
Pins that are to be altered to fit shorter tubes must fit those tubes so perfectly that there is no play of the pin in the tube. This can be accomplished with the reverse end of the instrument

described for shortening the arch-pin tubes.

APPLICATION OF THE .030″ DIAMETER ARCH.

The technique of the application of this arch as described by Dr. Angle in the DENTAL COSMOS of August 1912 and January 1913 can hardly be improved upon. In applying this technique in practice I have made some slight changes that have been helpful to me. When soldering the buccal tube on the molar band the mesial end is placed far enough back on the molar band so that the sheath nut turns in the embrasure between the molar and the premolar; this gives more room for treatment of the

FIG. 6.

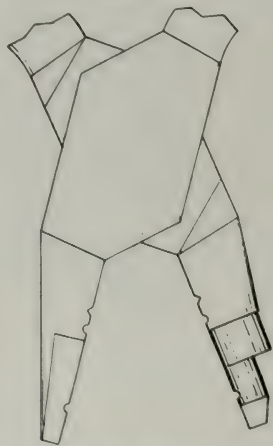


Technic model—buccal view.

premolar teeth, either with pin and tube or lock hook. In all cases where there is lengthening of the dental arch, when measuring for the middle section allowance should be made for a loop just mesially of the screw section. (See Fig. 6.) The long middle section arch as manufactured will be found too short to allow for loops in most cases, and it will be necessary to insert a short piece of .030″ diameter wire between the square ends of the arch-wire; this piece can be made of the .030″ gold-platinum retaining wire and soldered by using the solder tubes.

The arch-wire must be fitted nicely to each embrasure and convolution of the tooth surface, which makes a more sightly and more easily cleaned apparatus. The necessary bands can be made accurately by the use of Dr. Young's pliers. (See Fig. 7.) After the right-sized middle section has been procured, the arch-wire is adapted to the teeth by first placing its end in the screw section and then bending it to fit the labial surface of the band on the first banded and most distal tooth. Then the vise is screwed on the arch-wire, and the vise rod is bent so that the end comes just over the center of the bore of the arch-pin tube. I prefer to use a vise rod with a hole drilled in the flattened end, as first made by Dr. Angle, shortened to about the length of one and a quarter inches, rather than the pin-carrier, as a better alignment of the pin can be

FIG. 7.

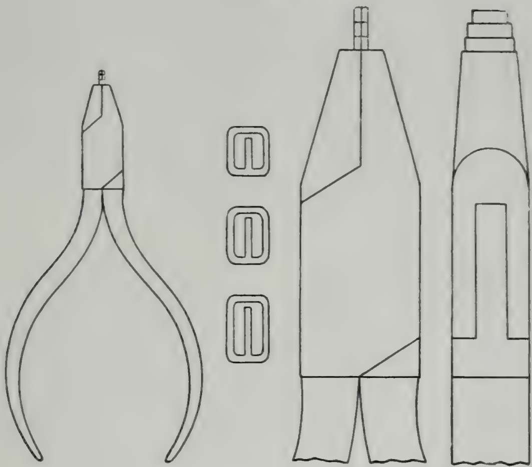


Young's pliers.

made by it. Now the position of the center of the bore of the pin-tube on the arch-wire is marked carefully, and the arch-wire is removed with the vise and rod attached. This can be accomplished by unscrewing a half turn or so the thumbscrew that holds the vise-rod in the vise: after removing, the thumbscrew is gently tightened up, which brings the vise-rod back into its proper position. A pin, with a ring of solder on the crescent end, is placed between the flattened end of the vise-rod and the mark on the arch-wire, and soldered carefully with a delicate flame; this operation is repeated on each succeeding tooth separately, until the screw section is reached on the opposite side, and all

pins are in place. (See Fig. 2.) This treatment will, when each pin is in its corresponding tube, and the screw section screwed up without pressure, make an arch that is *passive,* and should be so worn for two or three weeks, that the patient may become accustomed to it. This adjusting of the pins on the arch-wire in a passive way appeals to me more than having them so placed on the arch-wire that, when the patient is dismissed for the first time with everything in place there will be a good deal of pressure on the teeth, causing much irritation if there is to be much root-movement, and probably much surprise to the orthodontist, if he has relied on one molar on each side for anchorage. As the force expended with the pin and tube is so positive, something is sure to move; so, with these appliances, the anchorage must be looked to most carefully.

Fig. 8.



Latch pin.

Fig. 9.

A B

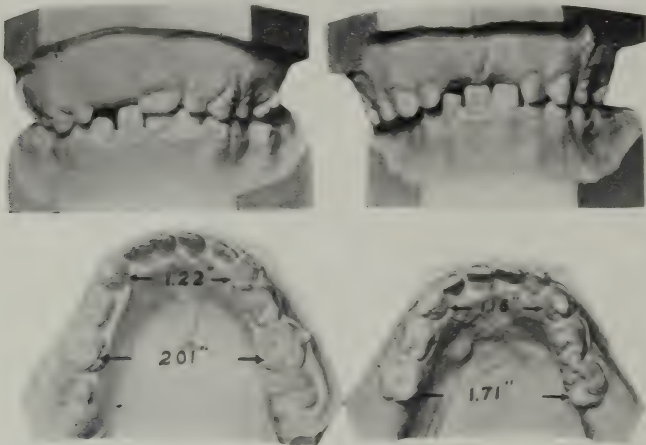
A, Deciduous technic model—front view. B, Buccal view.

AUXILIARY LOCK PIN.

In cases where it is necessary to use intermaxillary elastics, owing to the intermittent strain on the arch breaking the arch-pins off the arch-wire at the soldered joint, I have devised a latch-

pin that has given me great satisfaction. (Fig. 8.) These pins are made with pliers, by winding .022″ gold-platinum and pushed home. Should the loop not engage the gingival end of the tube properly, it is bent into place with the retaining wire around the beaks, using the step necessary for the length of the tube used.

Fig. 10.



(Wm. L.)

Fig. 11.

Deciduous technic model—occlusal view.

LOCKING THE PIN IN THE TUBE.

The arch-wire is held over the pin with a pair of How pliers, modified with a groove on their beaks to grasp the arch-wire tightly; then the loop portion is pressed against the wall of the tube and pushed home. Should the loop not engage the gingival end of the tube properly, it is bent into place with the Young band-adapter. The placing of one of these pins on each canine tooth will take the strain from the other pins on the arch-wire, and make the apparatus much more rigid.

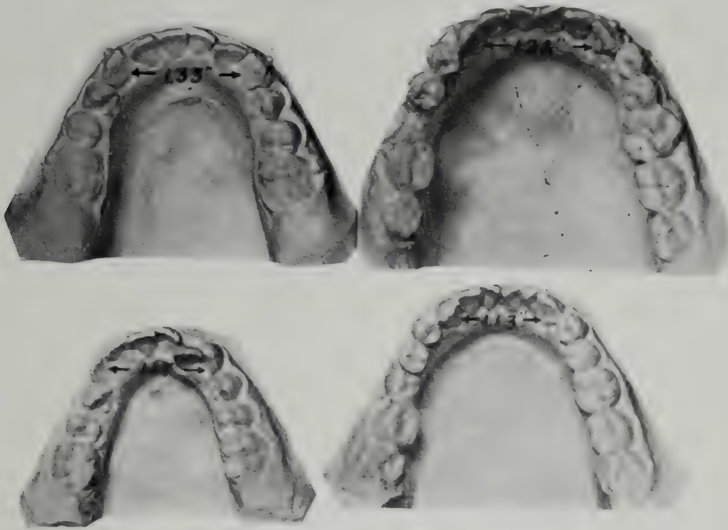
In applying this new appliance to deciduous or mixed dentures, where expansion is required between the canines, one of these pins on each canine will make a sure and firm lock. (See Fig. 9, A, B.) Each canine tooth is banded, and to each band an arch-pin tube of proper length is soldered. On the upper canines this tube can be .13″ or .15″ in length, according to the length of the tooth; in the lower canines, in nearly every case, owing to the overbite and shortness of the lower teeth, a tube not longer than .10″ will be found preferable. In treating these young cases, owing to the bulkiness of the threaded section of the arch and buccal tube, a latch-lock on the molar band ought to be used.

FITTING THE ARCH-WIRE.

The measurement is taken with soft wire as before, allowing for a loop me-

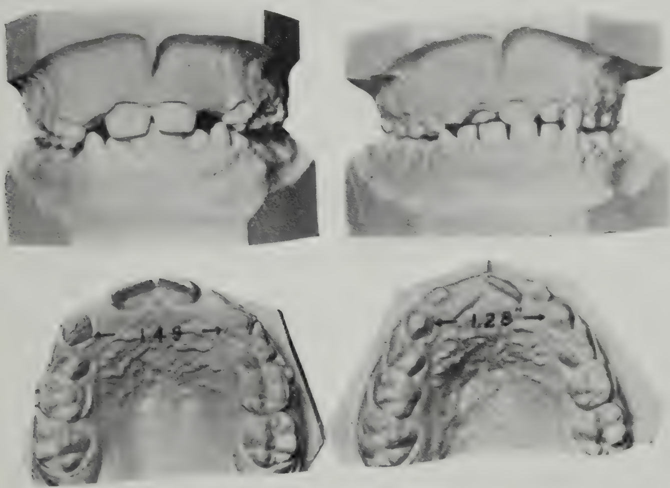
sially to the molar and canine on either side, and then the middle section of the arch is soldered to the male portion of the latch-lock, and a loop is bent, using the small step of the Young pliers; then the arch-wire is fitted nicely to the labial surface of the canine tooth, the arch-wire marked under center of pin-tube, and the latch-pin soldered into place, using a blunt pair of solder tweezers to hold the pin. Now replace the male portion of the latch-lock and see if the pin is parallel

Fig. 12.



Cases under treatment. (Miss P., and N——r.)

Fig. 13.



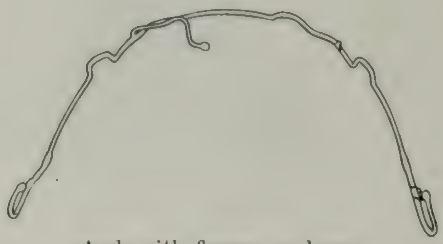
(Annie W.)

to the tube. If it should be out of alignment, take two pairs of Young pliers, grasp the arch-wire on each side of the pin, and twist the arch-wire upon itself either forward or backward until the pin is in perfect alignment. Now bend the loop in the arch-wire mesially to the canine tooth, using the larger step of the pliers if much expansion be needed, and continue with another loop mesially to the canine on the opposite side. We then fit the pin as before, follow with the loop mesially to the latch-lock, and finish by soldering the male portion of the latch-lock to the arch-wire, seeing that it is in proper alignment with the female portion on the molar band. Treatment in these cases is obvious; opening of the loops mesially to canines will give lateral (see Fig. 10) expansion, and opening of the molar loops will cause anterior pressure. The arch-wire should be lengthened no more than the width of the wall of the arch-pin tube for each treatment, and the patient seen once every three weeks. In cases that demand the use of intermaxillary elastics, these simple attachments will be ample to stand all strain.

FIG. 14.

Arch with fingers on upper.

FIG. 15.



Arch with fingers on lower.

TREATMENT OF MIXED DENTURES.

In the treatment of mixed dentures, after the proper stimulation and expansion is gained in the premaxillary region, I have found that the crowding of the anterior teeth has been remedied by nature without attaching these teeth to the arch-wire, the teeth being brought into perfect alignment by the natural muscular forces of the tongue and lips. With an arch arranged as in Fig. 11, there is nothing on the lingual side of the teeth to obstruct the natural internal forces. The cases shown in Fig. 12 are under treatment in this way.

It seems to me to be against all principles of natural development to band an erupting and undeveloped permanent tooth and fasten it rigidly, even to a wire as light as .030″ in diameter. May we not be too anxious and arrest nature in her wonderful workings? In cases in which it has been necessary to assist nature, as illustrated in Fig. 13, in order to overcome attaching these teeth by bands and pins to the arch-wire I have soldered to the arch-wire finger springs of .022″ gold-platinum Angle retaining wire, guiding them into their normal positions in the arch with gentle yet positive pressure. (See Figs. 14 and 15.)

TREATMENT OF PERMANENT DENTURES.

After the arch-wire has been fitted passively, and the patient has become accustomed to it; treatment consists in a gradual straightening of the arch-wire, until the correct arch form has been gained. This straightening of the arch-wire and corresponding movement of the teeth can be better controlled if the arch-wire is changed only at one point; remembering that a bend made to straighten out the arch-wire always means a controlling bend in the oppo-

site direction, in order that the right relation may be given to the end of the arch-wire with the screw section. For example, to bring out an interlocked lateral, a bend is made outward between the mesial angle of the lateral and the central, with an inward bend between the distal angle of the lateral and the canine, which brings the end of the arch-wire back into alignment with the telescoping screw section.

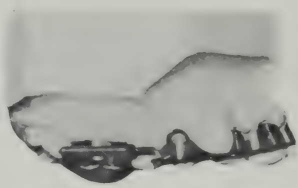
To gage the amount of movement that will be given when the pins are replaced in their respective tubes, the arch-wire is replaced into the screw section and the pins into the tubes on the teeth on one side of the bend just made, which we will call our control side; and the relation is noted of the pin to the tube of the tooth to be moved. The pin and the tube ought to be parallel and the movement of just the width of the wall of the tube, .008″. We also note the relation of the end of the arch-wire to the screw section, and, if it be not in perfect alignment, rebend it at the controlling bend until it telescopes easily into place. Should expansion of the molar region be necessary, or any change in the alignment of the molars, then we keep the end of the arch-wire slightly away from the screw section, so that, when slipped into place, it enters the telescopic section at such an angle that the necessary spring is given to procure the predetermined movement. Any change in the arch-wire means that the side of least resistance will be the one to be moved; therefore, again, "Look to the anchorages!"

TEETH THAT ARE IN TORSION.

The tube is placed on the band at a point nearest to the point of rotation. (See Fig. 2.) By bending the arch-wire so that more pressure is placed on the point out of alignment, teeth in torsion can be turned very easily and retained in position.

I have found in a number of cases where the anterior teeth are in torso-occlusion caused by contracted arch, that, if the canines and premolars are banded, and the necessary expansion is given to the premaxillary portion of the dental arch—this can be controlled by loops between these teeth, as described in the treatment of deciduous dentures—the muscular forces of occlusion working internally and externally will, even in cases of the age of twenty years, bring these malposed teeth into normal positions. (See Fig. 12.) Pressure may be applied to the end of the arch-pins to bring out the apices of the teeth by resoldering the arch-pins, using the soldering jig to hold the pin at the point that will give the predetermined amount of apical tension, or by using the Young pliers for twisting the portion of the arch that holds the pin or pins, grasping the arch-wire on either side of the pin or the section we wish to move, and twisting the arch-wire slightly in the direction we wish the apex of the tooth to travel. We must remember to re-twist the arch-wire on the control side near the neighboring pin, or the square end back into alignment with the screw section, so that the anchorage is not disturbed.

FIG. 16.



Technic model with arch-wire entering screw section at an angle.

My experience with most of my cases is that, if this new appliance is used to treat a case from the beginning, there is little movement to be made at the apex; rather a bodily movement of all the teeth. Where there is infra-occlusion of the molars or of the anterior teeth, these can be brought into normal occlusion by bending the arch-wire as it enters into the screw section as in Fig. 16. This will, of course, respond according to which teeth we make our stationary anchorage.

OPENING THE BITE.

To open the bite, individual bite planes can be soldered to the lingual surfaces of the bands of the upper anterior teeth, either made of staples of iridio-platinum wire or of heavy plate, which marks a great improvement over a continuous bite plane, where all the bands are fastened together, as each band can be made and cemented separately and connected on the labial surface to the arch-wire with the tube and the pin.

BODILY MOVEMENT OF ANTERIOR TEETH.

To stimulate the premaxillary portion of the dental arch and bring the anterior teeth out bodily, the tightening of the nuts on the screw section every few weeks will be all that is necessary, particular attention being given to supplying the auxiliary spring to the arch-wire, as in Fig. 6. When the nuts are screwed up, the loop is compressed, giving a gentle and more constant pressure to the middle section of the arch. This is just that mechanical stimulation necessary to develop bone in a physiological way. We must also see that the molar anchorage is reinforced by attaching both premolars and, if necessary, by using intermaxillary elastics.

In all movements of the teeth by this new appliance, the greatest care must be devoted to the anchor teeth, and the anchorage must be made doubly sure, as the force exerted by the spring of both pins and arch-wire is so positive that any weakness of anchorage will be surely felt.

SUMMARY.

The points to be remembered then, are the following:

(1) Well fitted and thoroughly cemented bands;

(2) Tubes parallel to the long axis of the teeth;.

(3) Neatness in soldering the pins;

(4) A positive anchorage; and, above all,

(5) A thorough knowledge of the dynamics of the arch-wire, which can only be gained by constant study of its possibilities.

A CASE OF COMPOSITE ODONTOME.

By Dr. WILFRED W. WOOD, Richmond, Va.

MR. L., about forty years of age, presented himself in November 1913, suffering with what he had been advised by several surgeons to be sarcoma of the lower jaw. The history of the case is as follows:

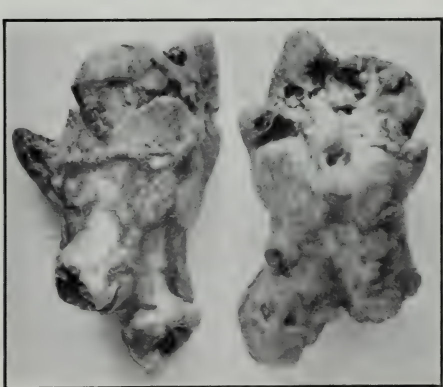
About three years prior to his visit, the patient, whose physical condition was excellent, had suffered severe neuralgic pains on the right side of his face. He had visited dentists from time to time, and had had tooth after tooth extracted until all the teeth on the right side of his mouth, both upper and lower, had been removed, without affording any relief. An examination showed an enlargement of the mandible about the angle of the jaw on the right side. This enlargement was first noticed several months prior to his visit. The pain had been getting decidedly worse for the last twelve months, during which time the patient had suffered several severe abscesses.

Upon a careful examination I discovered a small fistula. By passing a probe into this fistula, I could feel a hard substance, which my sense of touch convinced me to be tooth structure. I had a radiograph made, which revealed

the conditions shown in Fig. 1. As the radiograph showed a large tumor, which in no way resembled a tooth. I decided to make an exploratory incision before consenting to the removal of the entire lower jaw, which several surgeons had advised. Ether was administered, and upon opening the jaw I found the odon-

Fig. 1.

Fig. 2.

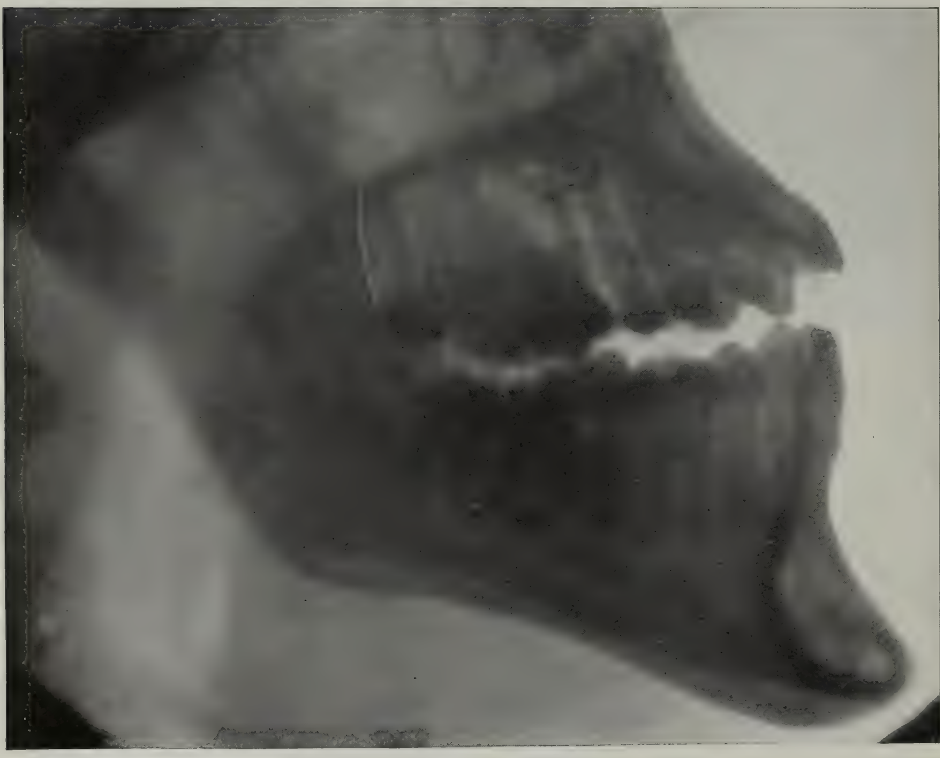


tome shown in Fig. 2. This I proceeded to extirpate by excising the process over and around it, then cutting the odontome into four parts, and removing each part separately so as not to fracture the jaw. Within two weeks the patient had recovered entirely, with absolutely no recurrence of the neuralgic pains.

SUPERNUMERARY TOOTH INVOLVING THE MAXILLARY ANTRUM.

By J. W. CRANDALL, A.A.Dent.Surg., U.S.N., Naval Training Station, Newport, R. I.

IN October 1913, G. W. ———, apprentice seaman, U.S.N., twenty-one years of age, was brought to my attention.



History. The symptoms were fetid breath, nausea on arising in the morning, pains in the right side of the face, intensified by cold or when exposed to damp or humid atmosphere, constant hawking and spitting, caused by a discharge of pus through the antro-nasal foramen into the middle and inferior meati and thence into the nasopharynx. There was a hard, bony protuberance

on the outer surface of the maxilla above and a little interior to the upper first molar, and a fistulous opening discharging pus through the gums between the first molar and second bicuspid.

The patient had a normal set of teeth as to number, except that the third molars had not yet erupted. An X ray showed the unerupted molars in their proper positions and an unerupted, impacted supernumerary tooth, the crown of which lay between the apex of the antro-buccal root of the upper first molar and the second bicuspid, with the root extending upward and backward at an angle of about 45 degrees, as shown in the accompanying radiograph.

SURGICAL TREATMENT.

Under a general anesthetic, an incision was made about an inch long under the lip and in the same direction as the tooth lay.

The crown of the tooth was found to be extensively decayed and the outer wall of the antrum necrosed. After cutting away part of the bone tissue with a fissure bur, the root was removed with a Cryer elevator and the necrosed bone cut away with an enamel chisel.

The antral cavity, after a washing-out with warm water to remove the pus and loose pieces of bone, was irrigated with a saturated solution of boric acid and packed with a wick of gauze dipped in the boric acid solution and sprinkled with aristol, allowing one end of the wick to extend out of the cavity to keep it open. After twenty-four hours the dressing was removed and the cavity irrigated with hydrogen peroxid, followed by boric acid solution, and packed very loosely with aristol dressing on gauze as before. This dressing was renewed daily for a period of about ten days, then every third day for a month.

A week after the operation the patient was allowed to proceed with his training at the station, but reported for treatment as previously stated.

After six weeks the treatments were discontinued, and the patient was discharged from treatment, but kept under observation.

Since the greater portion of the outer wall of the antrum had been removed, the antral cavity nearly filled with new tissue, and is practically obliterated. While there is a slight concavity, it is in such a shape as to permit no food or foreign bodies to lodge there.

The patient has been seen frequently during the past five months, and he suffers absolutely no inconvenience and appears to be in perfect health.

This case and the operative procedure adopted being somewhat unusual, it was thought likely to prove of interest to the dental profession.

THE RESPONSIBILITIES OF THE DENTIST IN SYSTEMIC DISEASES ARISING FROM DENTO-ALVEOLAR ABSCESS AS ILLUSTRATED BY THE ETIOLOGY OF PERIDENTAL ABSCESS.

By CLARENCE J. GRIEVES, D.D.S., Baltimore, Md.

(Read before the Northeastern Dental Association, at its annual meeting, Hartford, Conn., October 14, 1913.)

IT is more than significant that Sir William Osler(1), one of the greatest authorities abroad on internal medicine, should have said quite recently, "There is not one single thing more important in the whole range of hygiene than hygiene of the mouth," and that Dr. Charles H. Mayo(2), one of the greatest surgeons in this country, should have said just as recently, "The next greatest step in medical progress in the line of preventive medicine should be made by the dentists. The question is, Will they do it?" These are

TWO CLASSIC UTTERANCES REGARDING THE FUTURE SCOPE OF DENTISTRY.

These and many other equally earnest utterances from eminent authorities in all branches of the healing art point the trend and progress of modern medical thought leading to the obliteration of all atria for infection. They settle for all time the much-discussed question of the status and recognition of modern dentistry. Leaving nothing to be desired, they can be interpreted in but one way, viz, that the public generally and all allied specialists are willing and anxious to grant dentistry her due recognition in a realm even broader than she ever dreamed of, if the profession will accept the responsibilities and burden of the research which is a part of such recognition.

The reverse is also true, and is implied, if not stated, viz, that if we are not capable of nor willing to accept this opportunity, which is said to come but once to all men, then will we be adjudged unfit for the professional recognition already attained, not alone by the other professions but by the whole world, where nothing is granted which is not earned. Dentistry will then cease to be a profession, and will slowly but surely gravitate into a craft of skilled appliance-makers, the only position we then should deserve and could maintain.

These two utterances, indicating in no uncertain tone our undisputed field, our work for the present and future, should be accepted in the friendly, advisory tone in which they are made. Resentment of just criticism, slurring remarks on the diagnostic ability of the medical *confrère* in mouth diseases, where, owing to the inefficiency of the dental pathologist, he has been obliged to give an opinion when he would gladly have been excused, do not help a situation the basis of which is a defective etiology and pathology. It is our business to revise and correct our views on the relation of mouth lesions to bodily conditions and *vice versa,* and do it quickly. Since the oral cavity has been recognized as a fertile area for focal infection, it is being studied by all pathologists, whose findings are continually reported; we must not be obstructionists, nor complain of the invasion of our field, hardheaded in our narrow dental pathology—quite the reverse. We should gladly correlate the new data, much of which may not be practical, to the clinical dental experience of the past, and profit by the result.

The words of Osler, we are proud to say, have been anticipated by practical results almost before they were uttered. Reports of the progress of the oral hygiene movement from all parts of this country do more than confirm his statement, showing greater mental and physical efficiency in the patient wherever practiced. Mouth hygiene, which is no more than the application of the principles of clean modern dentistry, has, by eradication of pus foci, the stoppage of pus ingestion and absorption, and the restoration of carious areas, so improved nutrition by restoring occlusion as to cure many bodily diseases. The next great question is to furnish the means whereby all such sufferers may be relieved.

THE MODERN OUTLOOK OF GENERAL ORAL PATHOLOGY.

Mouth prophylaxis, the basis of the oral hygiene movement, was undertaken originally with nothing but local results as the best to be expected, and conceived as a treatment only for the prevention of dental caries and the cure of pyorrhea, the last and highest thought of a dental pathology which had as its whole field a tooth and its attachments, a local treatment based on a local, hence defective, etiology. The results were soon found to be constitutional as well as local; in fact, the bodily betterment frequently overbalanced the local betterment, and a series of systemic states, particularly gastro-intestinal affections, were corrected, while the local treatment frequently failed to prevent the recurrence of caries and pyorrhea, unless it was continually applied.

This should, and we believe it does, mark the parting of the ways from the old local to a new and general oral pathology; it demonstrates at once the fact that mouth lesions primarily are produced by diathetic and constitutional defects, slight though they may be, and are never cured, but only ameliorated, by local treatment; that the older and easier local dental pathology in which we were all trained is faulty, and at the same time it proves that this local treatment, by eradication, even for a time, of pus areas, the restoration of carious areas and of occlusion, relieves many diseases arising from defective oral function or focal pus absorption, leading into a broader general pathology, in which the whole economy is involved.

Of all those benefited by the oral hygiene movement, the dentist has profited the most, in the wonderful change for the better in his point of view, no doubt caused by the daily application of his own treatment; for, if he is relieving and curing serious if not fatal systemic diseases, why should he not consider himself a general pathologist, and solve the very difficult etiology of dental caries and pyorrhea alveolaris? With these illustrations of the correlation of the mouth as an integral factor in the general nutritional scheme, and of that, in turn, to the whole human body constantly before him, he is developing a greater respect for the vitality of the dental organ and its adjacent tissues. So we are beginning to *think* pathology, even if our daily practice is largely mechanical in the application of it.

We believe with Dr. Mayo that the next step in preventive medicine should indeed be made by the dentist. "The question is, Will they do it?" And the answer is that many are doing it, and we know that our profession is alive to the necessity of solving all the diseases related to the mouth, by the fact that over one-half of nearly the entire membership of the National Dental Association—which comprises about one-half of the dentists in the United States—have contributed from their own pockets over forty-five thousand dollars that this research may go on. Has there ever been such a personal contribution and display of interest taken by any of the other branches of the healing art toward the eradication of the diseases it is their privilege to treat? We think not.

INCONSISTENCY OF DENTAL PRACTITIONERS OF THE OLD SCHOOL.

It is all the more astonishing, therefore, in this situation, to find conservative operators who are fully alive to all

the dangers from the ingestion and absorption of pus from pyorrhea or fistulous alveolar abscess, who daily practice and preach perfect cleanliness of every exposed dental and oral surface, and who would resent any charge of neglect of a fistulous or pyorrheal pocket, nevertheless, as yet, quite content with imperfectly treated and filled necrotic root-apices, which always predispose to blind abscesses. In the mouth-hygiene crusade, we are told of the dangers of the ingestion of decomposing food and organisms lying in carious cavities about the teeth, yet these men compute the possible gingival area for pus absorption in pyorrhea and then entirely overlook the dangers arising from quiet toxic absorption due to blind-abscess areas, presumably because they do not open into the oral cavity, and are not perceptible. It is to this phase of the question, and particularly the responsibilities of the practitioner of dentistry in the premises, that we desire to call attention. This subject must be studied deliberately from every point of view, and without bias; censure should not be even indicated until all the extenuating circumstances in the early training of the dentist are considered. Prior to eight years ago, little was known and written of the dangers of focal infection. In medical literature, the relation of the diseased tonsil to endocarditis, chorea, and rheumatoid arthritis was among the first to be exploited, and dental literature, excepting the few sporadic cases reported, was equally barren. The dental student until very recently lacked, and in many schools today still lacks, training in the constitutional ill effects which might arise from devitalizing pulps, filling roots, treating abscesses, filling, crowning, and bridging teeth. Barring the errors in digestion which might be induced from carious cavities, malocclusion, or the absence of occlusion due to the loss of teeth, and the ill effects of mouth-breathing as related to the maxillary arch, mandible, and naso-pharynx, he was taught none of these dangerous sequelæ, ofttimes the result of his work, nor, when he took up the study of his profession, was their gravity grasped. His ideas of cleanliness were cleanliness for cleanliness' sake, or in order that local conditions should not recur; he extracted abscessed teeth and necrotic roots because they were dirty and interfered with the mechanics of his work, with little conception of serious systemic involvement which their continued retention might produce.

HARMFUL EFFECTS OF EXTREME PROPHYLAXIS PROPAGANDA.

Further, what has been written on this subject from the dental standpoint is so very recent and of so radically alarmist a type as to be misleading, if not actually harmful to the practitioner. A careful review of these articles leaves the reader under the obsession that every disease which flesh is heir to is produced by oral sepsis. They have the same defect and effect as have many of the articles emanating from the too-enthusiastic exponents of prophylaxis and oral hygiene by whom we are told that mouth prophylaxis, limiting caries and pyorrhea and most excellent in its way, has become the panacea for every disease known to man. Eventually an expectant laity is doomed to many disappointments from such excessive claims, which will only reflect discredit on this valuable procedure. This seems to be the day of the dental Gulliver magazine. Muckraking still continues profitable, and we are to be duly frightened into belief by a medical Rabelais. The result of these exaggerated statements is just what might have been expected, viz, a sharp division of our ranks into those who take the whole edition at a gulp, and without question immediately arise and testify, adding their quota of ills to the already harrowing list, and the other type of practitioner, who will have none of it, who is hidebound in a local pathology, who has seen pyorrhea, abscess sinuses, and fistulæ chronic for years with no effect on the patient's health noticeable to him. It is difficult to decide just which of these types is the more dangerous, and the fault lies largely in the absence of sanity and moderation in the presenta-

tion of these facts. Every new hypothesis is marred by the extremists. As the situation is serious enough, at the best, there is all the more reason for accuracy in stating it.

THE MOUTH AS A PORTAL OF INFECTION; LOWERED RESISTANCE AND IMMUNITY.

It has been said that every organism which eventually finds lodgment in the body and produces disease enters through the mouth. This is an argument used time and again for mouth cleanliness, and, while in a broad sense this statement is true, that is very far from admitting that the mouth, because it is the entry, is necessarily the portal of entry to the blood stream and tissues for all organisms which pass through it. For this cannot occur without some noticeable lesion in the soft tissues, and these have their guard in positive chemotaxis of leucocytes to all mouth membranes and in the protective action of normal saliva and its agglutinating mucus content.

The patient may consume typhoid-infected milk or water for years, and finally, owing to a lowered resistance due to some other cause, lose his immunity and fall a victim to typhoid fever. The actual portals of entry for the bacillus typhosus are Peyer's glands of the small intestine. The same may be said of tuberculosis; the entry is by the mouth and nares, the primary lesion arises usually in a distant joint or alveolus of the lung, and only occasionally in the mouth and throat. According to Simon(3), "Pneumococci may be found in the mouths of almost every individual, non-virulent, to be sure, in the majority of people, but virulent in fully fifteen to twenty per cent. of the cases, in the absence of any symptoms of disease. Streptococcus is here likewise not infrequent." It is stretching the imagination too far to presume that, because these organisms pass through the mouth or become a part of the mouth flora temporarily, cleanliness on the part of the patient and prophylaxis administered by the dentist will prevent such disease, no matter how helpful it may be in controlling oral sepsis and relieving the gastro-enterum of its burden of filth prior to and during the attack. Such statements are untrue, and, if reiterated by dental authorities, they discredit our intelligence and affect our status as scientists. It is all a matter of predisposition of certain tissues to infection by certain organisms, of local cell resistance and body immunity. Thus all mucous surfaces, particularly mouth membranes, are predisposed to chancre, the primary syphilitic lesion, the constitutional symptoms of which in the skin, joints, bones, and nerves occur later, and few if any are immune to syphilis. With the pyogenic cocci, there must exist some minute trauma as the primary portal, which they may find anywhere—as in a minute skin lesion; for instance, acne, pustule, phlegmon, furuncle, and carbuncle are different phases of infection due to the ever-present staphylococci and streptococci, which usually arise about a hair-follicle or sebaceous gland, just as they may invade the root of a tooth. The first stages are locally marked by fibrosis and the formation of few anti-bodies in the blood. When the local fight is lost, and the carbuncle stage follows, immunity is impaired, and marked systemic disturbance occurs, until the blood and tissues dispose of the invading toxins. Immunity to pyogenic cocci is relative and easily broken down only to be built up again. Pyorrhea and chronic dento-alveolar abscess are complicated by pus ingestion; against this the gastro-enterum also has its guard, which may prevail even when chronicity is extended, with apparently no systemic effect. This may explain, though it does not excuse, the tolerant attitude of those among us who have observed such cases.

While the dentist should know all the unusual types of mouth infection, his attention must not be diverted thereby from the more common lesions of daily occurrence. His responsibility lies in hourly applying principles as old as his profession to the alleviation of these lesions. There are periods of immunity to dental caries, the reasons for which are yet to be solved, just as there are years of immunity to other disease. Ca-

ries is not a pyogenic lesion nor necessarily produced by filth, though the cavities caused by caries may harbor such as well as other pathogenic visitors, and eventually lead to infective trauma of the alveolus and gingivæ. Alveolar abscess rarely occurs, unless the root-canal be laid open by deep caries to pyogenic cocci. During these intervals of lowered immunity, it is the dentist's duty, therefore, to prevent focal infection by constant attention to all dental surfaces, and to educate the patient, as far as his visits will allow, by prophylaxis and the operations familiar to all. Gingival lesions, leading to pyorrhea—if the diathesis so predisposes—and producing pus foci, may occur at any period, and be due locally to defective interdental spaces, fillings, crowns and bridges, malocclusion, etc. It is a part of our work to correct, or more important still, not to produce such defects, and by prophylaxis to ameliorate as much as possible the gingival lesions. While it has been proved that prophylaxis by the dentist and the greatest care on the patient's part will not entirely prevent the common mouth organisms, to which they are susceptible, from invading enamel surfaces and gingivæ and producing caries and pyorrhea, still it should be possible to carry the patient through these periods of lowered immunity so that there will at least be no pulp exposure nor periapical infection, and the gingival type may be kept at the minimum.

EFFECTS OF INGESTION AND ABSORPTION OF ORDINARY PYOGENIC COCCI.

Conservatively stated, from the investigations to date(4), the only systemic disease resulting from the usual mouth lesions are produced by the combined ingestion and absorption of the ordinary pyogenic cocci. After entering the blood stream, the results of this attack may be grouped under the broad heading of septicemia, pyemia, bacteriemia, and allied affections. The distant disease manifestations are the effort on the part of the tissues, blood and lymph streams, to dispose of these organisms and toxins. They affect the muscles, causing myositis(5); the joints, producing arthritis, synovitis, etc.; the blood, causing septic and pernicious anemia, endocarditis(6), or pleurisy; the glands, producing lymph adenitis; the nervous system, producing toxic neuritis and degenerations; the organs of excretion, as the kidney, producing nephritis(7), and act on the skin to produce rashes. They affect the entire gastro-intestinal tract(8), causing septic gastritis and enteritis, cholecystitis, appendicitis, colitis, etc. Referring to unusual mouth-infecting organisms, there may be mentioned the recent work of E. C. Rosenow(9) and D. J. Davis(10) where the anerobic streptococcus viridans, commonly innocuous, is shown to produce endocarditis and arthritis, the portal of entry being both by pyorrhea and dento-alveolar abscess. The streptococcus hemolyticus pyogenes is said to act similarly. In the fatal cases of Hartzell, the fusiform bacillus, assuming many unusual forms in culture, was isolated from the blood after death resulting from pyorrhea and oral sepsis. Numerous are the cases of entry to the blood stream, with little local fibrosis and less pus formation, via the root-canal, of the influenza bacillus, though this type is difficult to distinguish from the hematogenic infections to be mentioned later. Much of this work, still in the research laboratory, is yet to be proved clinically. In the interim, the dentist can feel assured that the same sterilizing and operative methods successful in the past against the known pyogenic cocci will be effective against these, if he will only diligently apply them. In any consideration of this subject it is necessary at once to differentiate between the cases(13) where the pus is freely discharged into the mouth, to be ingested and absorbed by the gastro-intestinal tract, as in pyorrhea and fistulous alveolar abscess, and where, by retention, as in blind and pericemental abscess, its absorption occurs in the same areas of weakened tissue by which it was formed. Briefly, the local and general damage results in two ways—first, by absorption of the abnormal products of an intestinal tract disordered by continued ingestion of a greater amount of organisms and pus from the

mouth than the antitoxic glands can control, *i.e.* a species of intestinal putrefaction; second, by absorption into the blood and lymph streams directly from the exudation surfaces of the focal infection. It is probable, from the research now going on, that the latter is the more common and dangerous modus in both pyorrhea and fistulous alveolar abscess.

Rosenow's work would seem to confirm this idea, for he has discovered a virulent symbiosis of the streptococcus viridans and the fusiform bacillus, both of which mouth organisms are usually of a low pyogenic type, if pyogenic at all. Inoculation of the blood stream of rabbits by these mixed strains not only produces the joint, heart, kidney, and muscle changes common to the viridans, only of greater virulence, but just such well-marked lesions and ulcerations of the intestines as it might be reasoned would arise from the ingestion of pus containing pyogenic cocci. Whatever bearing this research may have on pyorrhea, the writer is convinced from the study of a large number of cases of fistulous dento-alveolar abscess, many of which caused serious systemic conditions, that absorption directly from the abscessed tract is the principal atrium to the blood and lymph channels—first, because, when these fistulæ close(4), as they frequently do, and no pus escapes into the mouth, the patients are worse, while their temperature goes down when the fistula opens and pus is flowing and being ingested; second, in blind abscess(14), all of the infective elements are contained in the tissues and not ingested, and in these cases even more serious and lasting joint, heart, muscle, and nerve disturbances occur than in the fistulous cases. We would not deny for one moment the effect upon nutrition of the lack of masticating function which such dental disease might inflict, nor the general digestive disturbance concomitant on continued pus ingestion—for it is the writer's belief that the malnutritional state thus produced so lowers local cell resistance in the mouth as to actually create chronic focal infections from minute trauma. While in the normal the infecting organisms would be thrown off with tissue regeneration instead of tissue loss, it is by these agencies that the vicious cycle is maintained.

SYMPTOMATOLOGY OF BLIND DENTO-ALVEOLAR ABSCESS, AND SERIOUSNESS OF THE DISEASE.

After over five years' observation with exceptional opportunities of a hundred-odd cases(14), the writer has seen many forms of the results of focal infection arising from alveolar abscess, and not one of these patients presented symptoms other than what might have been expected from slow pyogenic absorption; there was nothing unusual in the clinical picture(14):

> The greater majority were very ill patients indeed, but it was difficult to place their illness in any class; it might be said to be more rheumatoid than arthritic, more muscle than joint involvement. The almost invariable history of muscle pain and minute glandular enlargement, particularly in the back of the neck; the muscular involvement about the joint, rather than a true arthritis in the joint, which the patients call neuritis; the effect in the blood, as of a low toxemia or anemia; the pasty complexion, loss of appetite, debility, night-sweats, loss of body weight; occasionally low fever, running for weeks, rarely more than 100° and frequently subnormal; the general malaise, which Pickerill(15) aptly describes as "an increasing inability to do the usual normal day's work," the striking resemblance of incipient tuberculosis, actually misleading in some instances.

These were the symptoms of by far the majority of the histories studied. A transitory myositis or neuritis accompanied by anemia, in a word, describes the bulk of them. The remainder can be equally divided into rheumatoid and infective arthritis, arthritis deformans and endocarditis, toxic anemia, and neuritis. The fatal heart complications and peritoneal infections, and the cases of otitis media, so commonly associated with focal infection arising from the tonsil, were notably absent, neither were any of these diseases as lasting or virulent as similar states where the tonsils were the portal. As an illustration of the fact that diseases resulting from

dento-alveolar abscess are not as common as many authorities would have us believe—and this statement must not be misinterpreted as belittling the gravity of these conditions—it is to be noted that in five years' careful search only a little over one hundred have been associated with systemic disease out of the many under the writer's observation [14]:

> No doubt Dr. Gilmer [16] is correct in his statement that over twenty-five per cent. of all adults have alveolar abscesses in some form. But we do not believe that it necessarily follows that even twenty-five per cent. of this large number will show systemic damage from such abscesses, bad though they may be [and filthy locally, the elements protecting the gastro-intestinal tract], and the immunizing powers of the blood and tissues must be recognized in this connection.

With this plain statement of the seriousness of the situation before us, with the understanding, common to all, of the importance of the dental organs as nutritive factors, and how the loss of even one tooth will impair occlusion, on the one hand, and the grave dangers of infectious disease arising about them, while they remain comfortable and useful in mastication, on the other, and at the same time keeping in mind the fact that these focal areas may exist without local pain warning the patient, and that the systemic disturbance may insidiously arise from these, with no noticeable exacerbation in the local portal of entry, still we cannot analyze the question of the causes of dento-alveolar abscess. It is the writer's impression that the causes as heretofore given are defective and need revision, and, if this detail seems too trifling, let us remember the extreme gravity of many of these cases. If every member of our profession could see and realize the helplessness of a case of arthritis deformans, the utterly hopeless attitude of the patient, and the suffering protracted often into twoscore years, he would agree that no detail is small which caused such sorrow, no amount of study too great too relieve even one such case, and all would unite in condemning the criminality of careless root-canal work which might induce this and many other diseases.

Periapical infections usually result from the passage into the periapical space of the results of saprophytic pulp destruction aided by the gases that arise therefrom, or by the continuation of suppurative pulp processes followed by the invasion of the soft tissues by pyogenic cocci. The amount of tissue destroyed is in direct ratio to the toxicity of the organisms and the high or low local cell resistance, and all of these are controlled by the general body resistance or immunity—diathesis thus plays its important rôle here, as in other dental disease. The amount destroyed may be great, the exudate and pus reaching the mouth in the line of least resistance will cause fistulæ; or it may be of a low type and end in a sinus, the organisms, toxins, and pus all being retained, either to become organized or else to form only to be absorbed, creating a chronic blind-abscess area.

THE PATHO-HISTOLOGY OF THE PERIAPICAL CEMENTUM.

Herein lies the most important point in the study of periapical infection. The question of how much tissue liquefaction has occurred and how long the root-apex has been bathed in pus is paramount; in work, the vitality of the root-apex should be considered before methods or material for root-canal filling, etc. We therefore call attention for a moment to the patho-histology of the periapical cementum in which the apex of every tooth terminates, and through which the pulp vessels pass. These, it has been shown by Broomell and Stein, are frequently multiple and in delta form—just what might be expected, as they were originally the vessels of the dentin organ. The apical cementum is therefore built about them: this is also true of Volkmann's canals, conditions almost equaling bone in penetration by vessels and vascularity. There also exist a greater number of lacunæ than in other cemental areas, with canaliculi the course of which indicates a complete circulation of nutrient tissue juices from pulp to peridental membrane and *vice versa*. So this, the most cancellated of dental structure, if once ex-

posed to infection, is most difficult to free from it, as Hartzell[12] has shown.

If the fibers of the peridental membrane which penetrate the cementum be liquefied, and if the cemento-genetic or nutritive cell layer be raised for a period from its surfaces, if the dental pulp be suppurating or gangrenous, passing centrally through the periapical cementum on the one side, and if it be exposed to pus containing pyogenic cocci on the other—with its nutrient supply doubly cut off, cemental necrosis and infection may be a matter of but a few hours; for, even if the pus be evacuated and the periapical tissues readjust themselves, they are restored in unattached white fibers, and the nutrient vessels are of course never restored. The pathological picture then becomes that of a bone from which the periosteum has been raised on both sides, with no blood supply from the narrow cavity. In bone, such areas rapidly become necrotic and are finally sequestrated, when new bone is formed; not so the pericemental apex, for it is retained by the remainder of the pericemental membrane attaching the tooth, which may finally functionate perfectly while holding *in situ* a dead cemental apex.

RADICAL TREATMENT ADVOCATED IN BLIND DENTO-ALVEOLAR ABSCESS.

It is the writer's opinion that the apex thus becomes necrotic in nearly every fistulous case and in all cases of blind dento-alveolar abscess. This opinion is based on the results of the study of a large number of X-ray films and specimens. The specimens in section confirm the fact of the death of the pericemental tissue, and there are many in which the abscess sac, so called, does not involve the visible canal opening, but arises off some point below it, particularly in those specimens where it is difficult to locate the entry of the apical vessels. This opinion is further confirmed in the films by a few cases of well-treated alveolar abscess resulting in perfectly functioning dental organs which show no reconstruction of periapical bone, the space formerly occupied by the abscess being filled with organized fibrous tissue. This is the greatest argument against the vitality of the apex. Resorbed bone areas remaining uncalcified always indicate an irritant or necrobiosis; they are not nature's method of repair elsewhere in the body, why should they be so considered in the alveolus? That these root-apices are only tolerated by the tissues, and can become the nidus for any infective element reaching them via the blood stream, is also confirmed by examining the lacunæ of absorption, with which in most instances they are literally covered, while normally but few occur in the rest of the cementum covering the same root. Further, these areas are of the rough type of osteoclastic action associated with inflammation, and not the smooth, physiologic areas seen in deciduous teeth, to be referred to later. There can be little question, in the cases reported of successful treatment of chronic periapical infection, that all of the necrotic and infected cementum had been absorbed down to the areas made sterile by the penetration of canal medicaments, particularly if this be deep and the germicide be of considerable oxidizing power. This is further proved by a number of the writer's cases in which the canal apex could not be passed before operating, and at a later date, following extraction, these canal fillings, usually of cement and gutta-percha, were observed in the specimens apparently protruding from the root-apex. Closer examination disclosed the fact that the cemental zone had been visibly reduced, and instead of the filling projecting, the cementum had been absorbed from around it. This observation has also been confirmed by films taken at intervals. But one conclusion can be drawn from these data, viz, that normal function of the tooth depends more upon the ultimate vitality of the pericemental apex than upon the vitality of the pulp, important though that may be and while we recognize that the health of the pulp is the health of the apex, and that the apex rarely becomes diseased unless the pulp be involved as the portal. The pulp under prompt and correct technique may be treated and removed, while little

good comes from interminable medication of the root-apex, and its removal is not as successful as it might be:

> The writer wishes here to record the statement that there is, to his knowledge, no medicament nor method, germicidal, oxidizing, or electrolytic, that will revivify the pericemental apex. If it be vital, the tooth is healthy; if it be necrotic, the tooth is next to doomed. This is the point in treatment where materia medica stops and good surgery begins. . . . With the best of intentions, conservatism has been most detrimental to our patients' health (14).

Given a case of alveolar abscess produced by a dead pericemental apex, and in turn maintaining it, in a patient predisposed to systemic disease from focal pus absorption, marked by the diathesis known as arthritism, predisposed to recurring attacks of influenza or those of "toxin habit," apicoectomy and extraction are the only dependable procedures which will really prevent possible disease. This may sound radical, but in reality it is ultra-conservative, because in nearly every instance there is more than one possible focal (11) cause for the systemic attack, one (14) of which is primary, the others by hematogenesis, secondary, as will be explained later, but just as dangerous, and it is difficult to differentiate under these conditions. The dental specialist in association with other specialists having decided that a tooth may be involved, all the toxic focal areas as in the tonsil, appendix, Fallopian tubes, or urethra are obliterated, including the dental; but if that be left, the trouble will continue. No time is to be lost in prolonged treatments, and the patient must not be allowed to drift into chronic disease, while we try to save an abscessed tooth of doubtful function, at the best. The comparative vitality of the cemental apex is a most difficult matter to determine; if it does not respond to the touch of a fine barbed broach, if there is no response to an electrode placed in the canal and giving a light faradic shock, the only other method is that of carefully sterilizing and filling the canal, and subsequent study of a series of monthly X-ray films to note bone formation in the former periapical pus area. If this does not occur the tooth is under suspicion, and the patient should be fully warned of the dangers of the slightest premonitory symptoms, not in the tooth, but elsewhere in the body, particularly in muscles and joints.

PROCEDURE IN TREATMENT OF FISTULOUS DENTO-ALVEOLAR ABSCESS.

Fistulous dento-alveolar abscess rarely results from the dental operations in this day of improved technique, more powerful germicides, and greater knowledge in the use of them; and such as do present for treatment are in the acute stage, most difficult to abort. The responsibility of the operator rests in the application of every method known to his art, in taking sufficient time to open thoroughly all root-canals, and in filling them as skilfully as his technique will permit; and, if they cannot be opened and filled, he should admit it to the patient, who must be warned of the danger heretofore stated. Herein lies the culpability of the dentist; he must not allow the patient to pass from his hand under the impression that the tooth is free from disease, when he knows down in his heart that he has not reached an apex which is likely to be necrotic. "Bluffing" the matter through with germicidal pastes is gambling on the patient's ability to resist pyogenic after-invasion, with no risk to the operator and great danger to the patient. While sufficient time should be given for perfect sterilization, long-continued irrigation of fistulous abscess tracts is a waste of time, and frequently the superficial tissues are stimulated to heal over a necrotic apex, only to break down again, or take on the "blind" and more dangerous stage. If once convinced of the cleanliness of a canal, the operator should fill it, and if the fistula persist, X-ray films will show the need of apicoectomy. If this fail, as it frequently does, the tooth must not be allowed to remain a nidus for future infection, but should be extracted at once.

CAUSES OF BLIND DENTO-ALVEOLAR ABSCESS.

Blind dento-alveolar abscess where all of the tissue exudate and infective element is retained, quite the reverse of the fistulous type, is almost invariably caused by some error in judgment or technique on the part of the dentist, possibly from a lack of knowledge of the dangers resulting. This is no excuse—not knowing the law never excused its infraction—and we must keep informed in general pathology. Generally, hurry and "time-saving" on the part of an operator who knows better, which is most reprehensible, are the basal causes.

Blind periapical infection results generally from small shreds of necrotic pulp tissue left in the pericemental apex; from that "lazy man's excuse," viz, the application of mummifying paste to the apical third of the pulp; from failure to open and fill canals to the apex which, even if the pulp be removed, refill with necrotic tissue infiltrate; from the honest operator's attempt to treat tortuous canals which cannot be filled, and his unfortunate assumption that the tooth is a normal one, when it is not; from the sealing-in of pyogenic cocci, introduced by dirty methods; and, finally, from devitalization of not only the pulp, but the pericemental apex as well. Any one of these defects leaves the patient with a porous culture tube at body temperature, one end of which is in direct contact with the lymph channels, filled with pathogenic organisms and ideal means for injecting the periapical tissue with their products, many of which are gases retained under pressure from the canal filling, which frequently leaks just enough air, sometimes saliva, to maintain the aerobic organisms and furnish a perfect habitat for the anaerobe. There is little doubt that the pyogenic cocci are changed by such conditions and made less virulent or attenuated. This is proved by the fact that the type of infection is so low as rarely to break through the alveolar walls in fistulæ, as do the organisms undisturbed by the dentist, but it ends in a fibrous swelling over the root-apex. It is also pretty well established that this carelessness induces the incomplete sterilization common to such cases; this acts on the contained organisms and toxins just as it would in the making of vaccine in the laboratory, viz, the organism is so reduced in virulence by partial oxidation as to allow its passage for months into the soft tissues with little resistance and pus on the part of these tissues, and the patient is gradually sensitized, his general cell-resistance lowered, and both tooth and patient would have been better without the dentist's meddling. In pyogenic invasion it is a rule that the organism of low toxicity is met and usually conquered by local phagocytosis, ending in fibrosis with little pain and no systemic disturbance. But if the organisms be of high toxicity, the local cells are quickly destroyed, hence there is little fibrosis and much pus, accompanied by the usual systemic disturbances, viz, pain, chill, pyrexia, etc. If the patient recovers, it is by a general response of defensive blood factors, bacteriolysis, leucocytosis, etc., to the local call for help. In blind abscess, if it were only one or even two infections that the periapical soft tissues were required to control, systemic invasion would rarely occur. It is the chronicity which is dangerous, nature having no provision for daily toxic injection, after the local cells cease to be a barrier, except antitoxic bodies formed by the blood—and in the major portion of these cases there was no noticeable leucocytosis nor change in the opsonic index recorded.

THE WRITER'S PROCEDURE IN DOUBTFUL CASES.

Now we can understand why the blind is more insidiously dangerous than the fistulous periapical infection. Continued inoculation thus occurs from teeth comfortable in mastication, with no lesion but "a lump," and there is no pain —said to be "the cry of the tissues"— to warn the patient and dentist. Few cases of this character have ever been really cured by the writer, and "cured" in this instance means X-ray proof of a

fresh deposit of bone in the areas destroyed. Drainage does little good when there is no periapical exudate of pus to drain. The application of germicides never reached the periapical tissues unless forced there by the electrolytic method of Rhein, which the writer has found the best treatment. After study by films, however, which at first apparently confirmed the fact, by the light areas common to bony deposits, that new bone was really forming, when several such cases were explored the absorbed bone cavities were discovered to be of about the size of those in the earlier films, and it is probable that the lighter shade was caused by the zinc salts which were cataphorically driven into the tissues, and, being metal, interfered with the passage of the ray. Curetment and apicoectomy also cured a few, but whatever may be the judgment of others, the writer, if there be the slightest suspicion of association of a blind periapical abscess with systemic disease, and if it fail at once to show betterment, orders the tooth extracted.

THE QUESTION OF PULP DEVITALIZATION AND EXTIRPATION.

The importance of vitality of the pericemental apex has been discussed in the foregoing, and in none of these lesions is it in more danger of necrosis than in the operation for pulp devitalization. Without going into unnecessary detail, it might be well to mention the risk of continued medication, particularly with arsenic, and the danger of bad after-effects of surgical pulp removal when suprarenal extracts are added to the local anesthetic to control hemorrhage, which is nature's best wound-irrigant, followed by immediate root-filling. This brings up the whole question of just what constitutes complete pulp removal, and what happens when the pulp is removed. There are many interesting questions involved in the condition of the immediate cemental area where the pulp vessels enter. In the adult canal, closed as it is in most instances to the finest broach, as during middle life, where these openings are so fine as to be next to impossible to discern, it is his opinion, judging from the specimens which it has been the writer's good fortune to study, that in but very few instances can every bit of the pulp tissue be removed; it is generally torn away, leaving the immediate apical opening filled with a hair-like process of pulp tissue. In youth and adolescence there are cases of complete pulp removal, but these are the canals that are open and through which the broach freely passes, which give so much trouble and are difficult to fill, and in which the immediate root-canal opening is filled by blood-clot. It is improbable that the operator's broach takes with it some of the peridental membrane, as well as the pulp, and it is reasonable to expect at the immediate apex, shreds of soft connective tissue of which the pulp is formed and which are so difficult to remove; and when all of it is removed, the normal hemorrhage indicates a clot closing this opening in either case. If these soft elements are not infected by dirty methods, they are likely to become resorbed and organized, if not left in too great quantity, and the very successful root-canal filling will only barely reach them. So, if the apex is vital, the real root-canal filling, after all, which actually fills the immediate root-canal opening, is an organized mass of connective tissue fibers, just as in other wounds of other connective tissues—for we manifestly cannot expect anything else, since the peridental membrane and alveolus do not differ from other body tissues.

THE QUESTION OF ROOT-CANAL FILLING.

This immediately raises that much-discussed subject, viz, the filling of root-canals, which the writer hesitates to open, for fear that his attitude will be misconstrued; however, what follows is stated as a fact as far as careful observation can go. It must not be misinterpreted, nor used as an excuse for slovenly methods; it only goes to prove what a delicate operation root-canal opening and filling is, and that it cannot be given too much time and attention. The following statements are brought out to

again accent the importance of the vitality of the pericemental apex—for, no matter how fine the filling, it is a failure unless it preserves this vitality at the apex. Such living cementum will often take care of a root which is not filled so perfectly—and we can rest assured that the finest technique and the greatest care of the apex will never leave it in normal condition. It also must be kept in mind, in any study of X-ray films, that the germicidal filling pastes so much in use, which are easily pumped to the apex, contain some metallic base which will appear in the skiagraph as a metal, showing a deceptive white line to the apex. Many of these pastes set only partially, if at all, and their permanent antiseptic quality is a delusion which only lasts until oxidation ceases, when the sealing action is only equal to the consistence of the paste when introduced. So this is not a root-filling, neither must all of the dark periapical areas in films be misinterpreted as pus cavities, for unless there be tenderness on pressure of the alveolar plate over such areas, they are liable to be the resorptive areas which the writer believes to exist more or less periapically about every tooth from which the pulp has been removed. With this explanation, the writer presents the following

CONCLUSIONS.

First: It can be proved—as confirmed by all operators who collect and study X-ray films of their work—that few if any modern fillings reach and fill the immediate canal opening; there always is a slight space unfilled. Prior to the use of solvents, pastes, and cements, the older methods with amalgam and gold fillings never reached this area, and the clean cotton method came as near it as any of them, with no ill effects until the canal filling leaked. In fact, the older methods compared very favorably in point of result with the new. Numerous films prove this, with no evidence of alveolar disease, except absorption.

Second: The percentage of small abscesses is almost as great about well-filled canals as about those which have been thoroughly cleansed and not infected, where the filling barely reaches the apical third; and if the filling of the immediate canal-opening edges required the perfection of the cavo-surface edges necessary to a successful filling, there would be a greater percentage of recurrence of periapical disease than of caries about the cavity filling—while quite the reverse is the case. When seen in this light, the root-canal filling does not fill at all, and seepage of tissue fluids under pressure is prevented here, while the leakage of saliva in the cavo-surface margins is not; so there must be something other than the filling which closes the immediate root-opening.

Third: The root-canal which really can be filled at this point is the perforated or open canal of childhood. All operators know how difficult this operation is. The filling either protrudes or falls short. In each instance, we are told, it is tolerated or encysted by the tissues, which implies resorption and local phagocytosis—nature's and not the dentist's process.

Fourth: All the methods and materials succeed which fill the root-canal, provided it is not infected and can be sterilized. As, manifestly, all methods and materials cannot be right, there must be some other agency presiding over this operation than mere technique.

Fifth: What is the percentage of tortuous buccal roots in upper molars, mesial roots in lower molars, that have been filled to the very end? and what happens to the apex with multiple vessel openings —are they ever all filled? What has taken care of the root-apices? We can rest assured, if the success of the restoration of a pulpless tooth depended alone on every root-canal filling reaching the immediate canal opening, few teeth would be saved; yet we know the major portion are preserved to perfect function. Inasmuch as many roots are so tortuous that the pulp cannot be removed, consequently that part of the root remains unfilled, except by necrotic tissue. The most important point in the care of the patient is constant supervision of those toxically predisposed, in order that caries may not become so deep as to reach

the pulp and necessitate devitalization. When that is inevitable, it then becomes a question of just how much vitality can be retained in the periapical cementum, or how much of it is lost by pulp devitalization and canal infection. It would appear that, if the clot from pulp removal, or the bits of pulp left in the immediate canal opening, simply become organized or are controlled by germicides, and if the filling approach nearly to this opening, then the clean pulp apex acts as an innocuous foreign body, stimulating the tissues to physiologic absorption by giant-cell function and leucocytosis.

Further, it is the writer's belief that this occurs in degree in every case when the pulp is removed and the canal successfully filled. All the not-vital periapical cementum exposed to the tissues is resorbed, unless it is infected, when necrosis produces a pus area. Each root of a pulpless tooth thus becomes an area of local lowered cell resistance, which may, at any period of lowered vitality, become the nidus for infection conveyed to it, not via the root-canal, but via the blood stream, by hematogenesis. All of us have opened roots well filled years previous, and assumed the blame for an abscess, only to find that the patient had a cold, particularly pharyngitis, a developing sinusitis, or follicular tonsillitis. Influenza or pneumonia, or an appendicitis, will frequently prove the portal of entry for organisms, and toxins are conveyed by the blood stream to a semi-necrotic root-apex, a nuisance to the local cells and needing their constant phagocytic supervision. A large percentage of these hematogenic infections are associated as secondary toxic areas with infectious diseases in which the organism can be recovered from the blood stream and is hemolytic. They also follow operations which disturb large pus pockets elsewhere, by metastasis. The etiology of peridental abscess is most instructive in this connection, for it is a blind retentive infectious area, lying in the peridental membrane attached to teeth with vital pulps. The fact that the pulp is vital and that these foci are absolutely isolated from bacterial contamination from the oral cavity, excludes the rôle of local infection and allows an unprejudiced view of the results of infection via the blood from constitutional states or portals of entry elsewhere. Without going into the question as to whether these groups of epithelial cells are glandular, or isolated cell-rests of the external epithelium of the enamel organ, it has been shown that they have no connection with the mouth. The work of Dr. Black, and the recent paper by Dr. Kirk([17]), in which he calls attention to the part these areas may play as of local lowered cell-resistance in pyorrhea; the report of a case made thirteen years ago by the writer where hematogenic deposits and pus were found isolated from the oral cavity in these cell-rests associated with recurrent tonsillitis and the rheumatoid diathesis, impress us with the great importance of their etiology, if for nothing else than to prove that a periapical tissue can be infected via the blood stream. We cannot fail to associate an early study of two cases made by Kirk, in which the pneumococcus was isolated, uncontaminated, from two such pus areas, with the statement by Coplin([18]), who says of the pneumococcus: "It is the specific causative agent in many coryzas and catarrhal inflammations of mucous membrane"—for so many cases have occurred in the writer's practice in which peridental abscess followed or was coincident with nose-and-throat conditions proved to be pneumococcus. A large percentage of such periapical areas resulting in the loss of vital teeth as well as those in which the canals were well filled occurred in a patient affected by the septic sore-throat epidemic in Baltimore, two years ago, conveyed by milk. The portal of entry in this epidemic was the pharyngeal membrane, not necessarily the tonsils, for it was just as virulent in those who had their tonsils dissected out. The organism is now definitely known to be a streptococcal strain closely allied to the pneumococcus.

It is more than probable that a large percentage of dento-alveolar abscesses occurring in the practice of careful operators arise by this process of multiple portals of entry for focal infection, and

that the tooth-root is often the secondary[11] rather than the primary area. In this important etiologic fact lies the vindication of the dentist. Criticism has been unfair simply because the critic did not know the dental difficulties—that many root-apices could not be preserved in vitality nor successfully filled. It might be said that the dentist should never be called upon to devitalize a pulp; that is good theory but poor practice, because the patient still presumes to make his own diagnosis of mouth disease, of which pain, generally from an exposed pulp, is the first symptom, and for pulpitis there is no treatment but devitalization and removal, with all the attendant risk.

In conclusion, it may be said that the life-and-death equation, with all of its responsibilities, enters quite as much into the daily routine of the dentist as it does into that of the surgeon—only it is not so immediately apparent. The fact that serious sequelæ arise years after the dental operation does not ameliorate for one moment the culpability of the dentist who misleads the patient and himself on this question.

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THE TEETH AND DENTISTS OF SOME MONARCHS OF FRANCE.

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(Read before the Eastern District Dental Society of New York City, at its regular monthly meeting, November 6, 1913.)

I see thee yet, fair France; thou favor'd land
Of Art and Nature, ...
Thou hast had many a tale of woe to tell
In ancient times . . . . . —*Anonymous.*(1)

"THE violent toothaches of Philip I. (1052–1108) were attributed to the vengeance of God."(2) Of St. Louis, Louis IX (1215–70), who died at fifty years of age, the records at St. Denis state—"The mandible of Monsieur Saint Louis, king of France, is, with the exception of a single tooth, wanting in teeth"(3), and it is said that scurvy contracted while on a crusade to the Holy Land was the cause of the loss of his teeth.(4)

PIERRE DE LA BROSSE, DENTIST TO SAINT LOUIS AND PHILIP III.

"Pierre de la Brosse, the barber-surgeon and dentist of St. Louis, gained the favor of Queen Blanche"—wife of Louis VIII, and regent of France during the minority of her son, St. Louis—"by treating the mouth of this princess with dexterity, and, if she had lived during the reign of Philip the Hardy"—Philip III (1245–85), the son of St. Louis —"probably De la Brosse would not have been hanged on account of the hatred borne him by Marie of Brabant, the second wife of Philip, upon whom, if one can trust the chronicles of that time, he had performed clumsy and painful operations."(5)

Most historians tell us that De la Brosse, whom Philip had made his prime minister, had an antipathy to the queen of France, Marie of Brabant, and, resolving to encompass her downfall, paid another to publicly accuse the queen of having poisoned the eldest son of Philip III by a former wife—he had died suddenly at the age of twelve years—and to charge her with the intention of making away with the two surviving princes, in order to clear the way to the French throne for such children as she might bear the king.

In consequence of these accusations, the queen feared she would be burned at the stake, but her brother, the Duke of Brabant, sent a knight to justify her innocence by challenging the accuser to combat. According to one story, the accuser, failing to accept the challenge through cowardice, was declared guilty of calumny and expiated his crime on the gallows. According to another story, the king, in order to clear up his doubts on the matter, resolved to consult a beguine of Nivelles, who believed herself inspired. He therefore dispatched a knight templar to Nivelles, who brought back the following answer from the prophetess: "Tell the king, he should not credit those who speak ill of his illustrious consort; she is innocent of the crime imputed to her; he may safely rely on her fidelity to himself and his children." The king being thus convinced of the villainy of De la Brosse, ordered him hanged at Paris in the presence of the nobles(6) (7) (8).

A Wagnerian student may ask if these facts were known to Wagner, and influ-

enced him in the composition of Lohengrin.

THOMAS DE PISAN.

Charles V, also called The Wise (1337–80) gave his dentist Thomas de Pisan lodgings at the Louvre, where, it is said, De Pisan enjoyed the patronage of a large *clientèle* from the court.(9)

CHARLES VII, AND HIS DENTAL ILLS.

Charles VII, surnamed The Victorious (1403–61), whose reign is famous in history and romance through the activities of Joan of Arc, died in his fifty-ninth year at Mehun-sur-Yèvre. He had very poor teeth. The cause of his death according to Grimard(10) was cancer of the cheek, incited or aggravated by a sharp carious tooth. There is a legend that the king, fearing he might be poisoned by his son—afterward Louis XI—allowed himself to die of starvation. "By St. John," said the king, "we will eat no more."(11)

It is more than likely the king's "hunger strike" was made neither voluntarily nor through the fear of poison, but because he could not eat. Still, a fear of being poisoned would not perhaps have been wholly unreasonable, for his son, after making many unsuccessful attempts to gain the throne, was compelled to seek the protection of the Duke of Burgundy; and when, thus exiled—so the story goes—he heard of the king's death, he was so elated that he could not conceal his joy.

It appears that the king suffered also from a lesion of his leg. Was it cancer, tuberculosis, or a varicose ulcer? The evidence favors the diagnosis of varicose ulcer.(12) Potiquet, quoted by Cabanès(13), declares it would be hazardous to diagnose the king's buccal condition as either noma, or cancer, or actinomycosis, or a suppuration of the maxillary sinus. Cabanès(14) believes the king died of tuberculosis, which had been fatal to his three brothers before him, and that the buccal trouble was only incidental.

The following is an extract from a letter written by "the ministers and other people of the counsel" five days before the king's death(15), addressed to the dauphin, afterward Louis XI, officially advising him of the disease from which Charles VII was suffering:

> Our Most Redoubtable Lord! As humbly as possible we recommend ourselves to your good grace. May it please you to know, Most Redoubtable Lord, that, some time since, a certain disease attacked the King, your father, Our Sovereign Lord; which commenced at first as a toothache, following which the cheek and a large part of his face was much changed and a great amount of matter discharged. After the tooth had been pulled out, the wound healed in such a manner that, according to the reports made by the physicians, we had a sure hope he would become well in a short time. The thing has been of longer duration than we thought it would be, and it appears to us he has grown weaker [etc.].
>
> Written at Mehun-sur-Yèvre the 17th day of July. [Signed by the Ministers, etc.]

OLIVIER LE DAIM, DENTIST TO LOUIS XI, AND HIS PROSTHETIC WORK.

Olivier le Daim was the dentist of Louis XI (1423–83), who made him prime minister, governor of St. Quentin, and gave him the title of Count of Meulun. Although Louis was cruel, tyrannical, perfidious, and superstitious, he patronized learning, encouraged art, manufactures, commerce, and mining, improved roads and canals, and permitted, in his favorite residence, the Château of Plessis-lès-Tours, Olivier le Daim and his barber *confrères* to make dental prosthetic experimentations upon cadavers, and to dissect cadavers, and there was performed for the first time in France "an operation for replacing the inferior part of the mouth by a metal jaw—the patient living twenty-nine years afterward."(16)

The remnant of this château has been restored by its present owner, a physician, Dr. Edmond Chaumier, who has established there a "Vaccination Institution." By him the "Salles des Gardes" of the palace have been converted into a museum containing prints and engravings relating to Louis XI and his time, and a collection of objects pertaining to variola and vaccination against smallpox.

After Louis' death, Le Daim was given

over to his enemies, and hanged by order of the States-general.

At Cléry, in the Nôtre Dame basilica, where Louis XI and his Queen Charlotte of Savoy were buried, one may visit the royal vault and view two mandibles and two badly mutilated skulls, which are asserted to be those of their royal majesties. I do not know much about queens' teeth, but from what I have read of those of kings, I was satisfied that there were in the maxilla and mandible exhibited as those of Louis XI too many teeth for a man who died at sixty, and far, far too many teeth for a king of France, especially one who departed this life in 1483.

In connection with Louis XI occurs the name of Charles the Bold, Duke of Burgundy (1433–77), who held Louis a prisoner in his castle at Peronne, and, in a rage on account of Louis' perfidy, came near putting him to death. Charles the Bold was treacherously killed at the battle of Nancy, where, so Jean de Troyes states in his "Chroniques," "his body, greatly disfigured, was identified principally by the absence of his upper teeth, which he had lost through a fall."(17) They point out today at Nancy the spot where Charles fell in battle, and the spot, with the date (1477) marked in large figures, to which his body was conveyed and identified.

JEAN GOEUROT, PHYSICIAN TO FRANCIS I, AND HIS DENTAL KNOWLEDGE.

Francis I (1494–1547) suffered from carious teeth, and it is said that he was attended by a special dentist. His physician, Jean Goeurot, wrote a book—"L'entretiennement de Vie," 1541—cited by Grimard(17), in which, after describing several diseases, he speaks of one, not dangerous but very painful—"the toothache," and alludes to it as follows: "Among all the immortal passions of man, this pain is the most annoying," and he suggests the following remedies for allaying this particular "immortal passion": "Hold in the mouth camphor-water, or a decoction of camphor in vinegar. Place in the carious tooth a little cotton soaked in oil of aspic. Wash the mouth with a decoction of pyrethrum, mint, and rhubarb, mixed with some hot wine." To stop a "headache caused by a toothache," he advises: "Shave the head and shampoo it with the milk of a wet-nurse who is nursing a girl." To whiten the teeth, he recommends the use of powdered stag's horn.

LAURENT JOUBERT, AN ORAL PROPHYLACTIST.

Laurent Joubert, the physician of Henry III (1551–89) admitted that urine had some virtues as a mouth-wash, but thought it better to use a mixture of wine and water for this purpose. He states in his work "La Santé du Prince," 1579: "One must not forget the mouth in order to preserve the teeth, gums, and good breath, which is of great importance to health, because the air which one inspires and expires through the mouth comes in contact with the dirty teeth and gums, thus infecting the air, which gives its bad qualities to the lungs and heart. In this way many persons may become hectic."(18)

DENTAL TOILET OF HENRY III.

The Italians, led by the mother of Henry III, Catherine de Medici (1519–89), brought into vogue at the court of France toilet articles of all sorts, cosmetics, perfumes, rouges, wigs, and artificial teeth. A satiric writer, after witnessing the making-up of Henry III, relates how the royal mouth was cared for: "I thought that the rubbing of the lips would be the last ceremony, but instantly I saw another servant kneel before the patient, take hold of his beard and pull down the lower jaw; then, having moistened his finger in I do not know what kind of water, in a little glass vessel, he took a certain white powder with which he rubbed the gums and teeth; then, opening a little bottle, he took out some small things made of bone—I do not know what—placed them on the gums and fastened them with fine wire to the adjoining teeth on either side."(19)

GOLD FILLINGS OF HENRY IV.

Henry of Navarre, afterward Henry IV of France (1553–1610), was much

troubled with toothache. His accounts in the "Archives of the Basses-Pyrénées" show that he expended in 1576 twenty sous a month for toothpicks, and in 1581 for "gold to fill the teeth of the king 15 livres, 15 sols,"(20) (21) a livre being equal to 20 cents, a sol equal to two cents.

It is probable that only the teeth of princes were filled with gold in the sixteenth century, because Ambroise Paré, who lived then and wrote of the dentistry of that time, makes no mention of gold for filling teeth. He tells us—"If teeth have holes, they should be filled with cork or lead. Lost teeth should be replaced with teeth made of bone or ivory or with sharks' teeth [*rohart* teeth = *requin* teeth(21)], which are excellent for this purpose, and these should be fastened to adjoining teeth with common gold or silver thread."(23)

TOOTHACHE PLASTERS AND THE "BEAUTY SPOT."

There were many remedies for toothache, but the one most used toward the end of the sixteenth century consisted of mastic spread on a piece of black taffeta or velour, which was placed upon the cheek over the aching tooth. If these small black patches on the face did not relieve the toothache, they at least enhanced by contrast the brilliancy of the complexion. The coquets were not slow in noticing this fact, and soon all the women at the court of Henry IV used them. Thus was the beauty spot or *mouche* introduced into the world of fashion.(23)

Judging from Henry's character, it is not likely that he ever used a beauty spot to stop a toothache, but he did experience a more heroic remedy, as the following story attests: On June 9, 1586, Henry IV, the queen, Marie de Medici, "who had taken more to drink than she intended," and M. de Vendome were crossing the Seine at Neuilly, when they were accidentally thrown into the river and almost drowned. The queen was seized by her hair and dragged out of the water, while the king and De Vendome saved themselves. "This accident cured the king of a severe toothache from which he was suffering, and the danger being over he made light of it, saying he had never found a better remedy for the toothache," and that "they had eaten too much salt at dinner and wanted to take a drink."(24)

The medical *personnel*, etc., of Henry IV, in 1592, does not include a dentist —see "National Archives of France," quoted by Minvielle.(25)

DUPONT, DENTIST TO LOUIS XIII, AND TRANSPLANTATION OF TEETH.

Dupont, the dentist of Louis XIII (1601–43), gave himself the following titles: "The charitable operator who demonstrates the manner and the method of preserving the teeth," and "Operator to the King, recognized expert for all sorts of diseases and accidents happening to the teeth."

Dupont probably found his royal patient a troublesome one to operate on, for De Prade(26) says that the royal tongue was so long and so thick that, when it was protruded from his mouth, the sovereign had trouble to withdraw it and was obliged to shove it back with his fingers. Dr. Potiquet(27) and Dr. Cabanès(28) think that Louis XIII had adenoids.

The brochures of Dupont, which appeared at Paris in 1633, can be found in the National Library of France(23), and treat chiefly of the transplantation of teeth. The following is a translation of the title of two of his works: "A New Remedy for Diseased Teeth, which Consists in Pulling Out the Diseased Tooth and Substituting Another which at the Choice of the Patient is Taken Either from a Dead or Living Person," etc.; and "A Very True and Certain Remedy for Removing and Preventing Disease of the Teeth Without Pulling Them Out."

THE MAXILLARY SINUSITIS OF LOUIS XIV. AND ITS TREATMENT BY DUBOIS WITH THE THERMO-CAUTERY.

There is an old superstitious saying that a boy born with an erupted tooth will have a great future; but, if a girl has an erupted tooth at birth, it is a bad omen for her. Louis XIV (1638–1715) came into the world with

two teeth adorning his upper jaw; nevertheless the glorious reign of Le Grand Monarque ended sadly. "Instead of the brilliant hero depicted in history," says "Le Journal de la Santé du Roi," we have "a young man an invalid successively attacked by severe illnesses; then a man always suffering, obliged to undergo serious operations; and finally a gouty old man, continually tormented with gravel, whose existence was terminated by gangrene."

It is stated by D'Aquin that "During the campaign of the king in Flanders (1676), his health, with the exception of a stubborn toothache, was all that could be desired. After the campaign, his toothache became worse. The essence of clove or thyme was given to relieve the pain, but the essence of clove burned his mouth and nauseated him so that he was given it only when the pain was extreme.([30])

In conformity with the professional etiquette of this period, the first physician to the king (D'Aquin) prescribed the remedies for the teeth, etc., and the dentist to the king (Dubois) applied them.

"During September 1678," D'Aquin tells us, "the king was troubled with the toothache, to which he is subject, and his right cheek and gums became inflamed. The abscess, which has suppurated internally through the use of poultices made of bread crumbs and milk, was opened with a lancet, and with the discharge of pus the tumor and pain ceased."([31])

According to D'Aquin, in January 1685, the king suffered from an osteitis of the superior left maxilla, following an extraction of all the teeth in that bone, from an inflammation of his left maxillary sinus, from a fistulous opening extending from the maxilla into the mouth, which would not heal and which permitted the passage of fluids from the king's buccal cavity into his nose, and last but not least from a most offensive breath, which was caused by the suppuration.

The first physician to the king, D'Aquin, the first surgeon to the king, Felix Tassy, and the first dentist to the king, Dubois, consulted, and decided that the actual cautery must be used upon his majesty. Dubois designed some special cauteries "to burn the edges as deeply as the caries demanded" and on January 10th, he applied the cautery to the king fourteen times. "He appeared," we are told, "more tired than the king who suffered."([32]) Dubois' tired appearance might be attributed to the fact that he knew the king rewarded handsomely a successful operator, but an unsuccessful one was liable to imprisonment in the Bastille.

"After this operation," D'Aquin further states, "we advised the king to use a mouth-wash consisting of alcohol, distilled vulnerary water, and orange-flower water, and to allow it to pass from his mouth through the fistula into his nose for the purpose of deodorizing the parts and promoting healing."

The cauterization of the king's jaw was performed at three sittings. After the last (February 1, 1685) the opening closed, but the nasal fetor continued until the suppurating sinus was cured, which happened at the end of the year.

The diseased maxilla of Louis the Great, Le Roi Soleil, did not make so much stir in the world of fashion as a rectal trouble from which he suffered.

Emperors, kings, queens, etc., have always been objects of imitation, therefore it was not altogether surprising that, after Felix Tassy had operated in 1686 upon the king's fistula in ano, the ladies and gentlemen of the court, magistrates, and soldiers boasted of their little fistulæ.

Dionis([33]) says:

> It seems that this malady [fistula in ano] occurs more frequently than formerly. One hears every day of operations being performed upon persons who do not appear incommoded. It is a malady which has become *à la mode* since the king was obliged to undergo the operation. Many of those who concealed their condition with much care, now have not the slightest shame in making it public. There are even some gentlemen and ladies of the court who have chosen Versailles as the place for submitting themselves to this operation, because the king inquires into all the circumstances of the malady. Those who had some little oozing

or slight hemorrhoids did not hesitate to present their behinds to the surgeon for operation. I have seen more than thirty who desired to be operated upon, and who were so foolish as to become angry when they were assured that there was no necessity for an operation.

Apparently the quotation from Lowell(34)—

He hath imitators by the scores, who omit
No part of the man but his wisdom and wit

—did not apply to the king, for there was no enthusiastic desire manifested to imitate the odor royal emanating from the king's suppurating maxillary sinus.

St. Simon in his Memoirs tells us that the abusive use of perfume by those who came in contact with the king, when he had the trouble with his maxillary sinus, caused him to prohibit the use of perfumes at court, because he detested the odor of all of them excepting orange flowers.(35)

THE FAR-REACHING INFLUENCE OF LOUIS XIV'S DENTAL TROUBLES.

Historians have often tried to find some excuse for the sad pages and unfortunate acts in the lives of monarchs. There may be some who believe the enervation and pain occasioned by the inflammation of his maxillary sinus were contributory influences causing the Great Monarch to commit the worst deed of his life, when, on October 20, 1685, he signed the Revocation of the Edict of Nantes. By this act the Huguenots became outlaws, at least one-fourth of France was depopulated, the commerce of France was ruined, the secrets of French manufacturers were obtained by other nations, and France lost the type of men who might possibly have averted the horrors of the French Revolution.(36)

Fagon informs us that in May 1696, the king was quite ill for about nine days, suffering from a painful tumor of the left cheek which extended to the maxillary glands.(37)

In 1707, a stump of a tooth in the mandible of the king, so Fagon says, caused a swelling of the gum, followed by a hard, red, and painful tumor of the chin, and when the stump—"which came out without pain"—was extracted, all the symptoms ceased.(38)

Dionis says: "The instruments for cleaning the teeth are usually made of steel, but those used on the king and princes are of gold. If there was a more precious metal, they [the dentists] would use it, because they are so magnificently rewarded."(39) From what has been cited it appears that the royal dentist Dubois, although his instruments were made of gold, failed to protect his majesty from the most royal toothaches and their sequelæ.

St. Simon recites that one day, while at dinner, the king complained to Cardinal d'Estrées of having no teeth. "Teeth, sire," said the cardinal, "eh! who is there who has them?" This amused the king, for the cardinal had a large mouth full of perfect teeth, which he showed whenever he spoke.(40)

The duties of the king's barbers, who received in 1663 from 600 to 800 livres a year, consisted in brushing the king's hair morning and night, wiping him dry after a bath, and cleaning his teeth.(41)

FRANÇOIS LE BERT (ALIAS DE VILLENEUVE), FIRST OFFICIAL "OPERATOR ON TEETH," AND HIS SUCCESSORS.

Dupont was probably the dentist of Louis XIV until 1669, when, for the first time in France, a special dentist with the official title of "operator on teeth" was appointed to the royal household. François le Bert, also known as De Villeneuve, a barber to the king, was the first to hold this position—from 1669–74. He received 1200 livres a year for his services.(41)

The duty of the "operator on teeth" to the king was "to clean and cut the teeth and furnish the roots and opiates when the king washed his mouth."(41)

In 1674 De Villeneuve's son succeeded his father and performed the duties of "operator on teeth," but never received that title.(42)

Charles Boisgotin, called Du Bois or Dubois, became operator on teeth in 1676, and held the position until 1708. In 1669 he was alluded to as "surgeon operator, Charles du Bois Guérin," at

which time he was assisted by Charles Arnault Forgeron, who succeeded him as official operator on teeth.(41)

Jacques Daviel was the first, in 1747, to perform the operation for cataract by extracting the crystalline lens, and, on January 1, 1749, he was also the first one to be titled "surgeon-oculist to the king," the position of surgeon-oculist to the king being thereby established about seventy-nine years after that of operator on teeth to the king.(42)

The operator on teeth to the king was often the special dentist to other members of the royal family, and in this way the income of the royal dentist was at times very large. It is estimated that the practice of the royal dentist brought him 5393 livres a year, which was an enormous sum for that time. Dubois probably lived at Versailles. Little is known regarding him; he wrote nothing and was not a member of the Corporation of Surgeons at Paris, for his name does not appear in the "Index funereus chirurgicorum parisiensium—1315–1729."(41)

Although Louis XIV had much trouble with his teeth and jaws, was practically toothless in his latter years, and absolutely so during his last three years, he apparently did not lose his appetite with his teeth. It is said that he ate so rapidly and enormously as to astonish all beholders, and used to observe that "the first mouthful of hot soup opened the gates of appetite."(43) Neither the king nor Madame de Maintenon ever wore artificial teeth, and Madame de Maintenon says in a letter to the Princess des Ursins: "I can scarcely see, my hearing is worse, and they can understand me no longer, because my articulation has gone with my teeth."(44)

The "surgeon-operator on the teeth" to Louis XV (1710–24) was Charles Arnault Forgeron, and Jean-François Capperon succeeded him, holding the position from 1722–63.(45)

It is stated that on April 17, 1722, the king had a large upper tooth extracted by Landumier or Landumiey, who was surgeon-dentist to Philip V of Spain.(45)

Bourdet or Bernard was ordinary surgeon, squire, and surgeon-dentist to Louis XV from 1763–74, when he became the dentist to Louis XVI.(45)

FOUCOU, THE ORTHODONTIST.

Joseph Dubois Foucou was the dentist to four sovereigns, Louis XVI and Marie Antoinette from 1790 until their death in 1793, to Emperor Napoleon I from 1804–14, to Louis XVIII from 1814–24, and to Charles X from 1824–30.(46)

Foucou had the title of "Doctor-Surgeon of the Old College of Surgery of Paris," to which he submitted a thesis in 1777—*De dentium vitiose positorum curatione.*(46)

THE DAUPHIN, AND THE OFFICIAL EFFORTS AT IDENTIFICATION OF HIS BODY BY THE TEETH.

Charles Louis, the second son of Louis XVI and Marie Antoinette, the dauphin of France and called the Duke of Normandy, was born on March 27, 1785. According to De Beauchesne, the queen furnished the details regarding the eruption of the deciduous teeth of the dauphin, stating that they appeared late without any disease or casualty excepting two or three convulsions.(47)

There seems to be considerable evidence that this dauphin of France was not poisoned in the Temple during the revolution, as is generally supposed, but escaped in a basket of soiled linen, a rhachitic mute taking his place and posing as the dauphin.

Cabanès says: "There is in the National Archives of France, F76808, a note relating to the original official report of the autopsy performed upon the dauphin in the Temple, which states: 'M. Lacompte, keeper of records of the minister of the general police, gave to Count Decazes: (1) The original official report of the opening of the body of the son of the king, at the Temple, dated 21 Prairial, year III (June 9, 1795) and signed by M. Dumangin, chief physician of the Hospice de l'Unité and by M. Pelletan, chief surgeon of the Hospice de l'Humanité. (2) A copy of the official report of the burial of the body of the son of the king, dated 22

Prairial, year III (June 10, 1795) in the cemetery of Sainte Marguerite, rue Saint Bernard, Faubourg Saint Antoine.' "(48)

Since 1816 all trace of these original manuscripts has been lost.

There appears to be good evidence that the child upon whom the autopsy was performed on June 9, 1795, was not the dauphin of France. All of this evidence, which is beyond the scope of this article, can be found in Cabanès' work.

In 1816, the French government ordered an investigation to find the body of the dauphin, but this order was countermanded, and the investigation never took place. (49)

In November 1846, some laborers, while digging in the old cemetery of Sainte Marguerite at Paris, found a small leaden coffin. Thinking this was the coffin of the dauphin, the curate of Ste. Marguerite, Abbé Haumet, had the contents examined by Drs. Milcent and Récamier, who agreed that—"The bones of the limbs, and the teeth, belonged to a subject more than fifteen years old." Prof. Lallemand and Andral, because the third molars were present, thought the subject must have been twenty years old when he died. (50)

From the above statements it is not likely that these remains were those of a subject dying at ten years of age—the age at which the dauphin was supposed to have died.

In 1894, at the suggestion of M. Laguerre, excavations were made in the cemetery of Ste. Marguerite in order to ascertain whether or not the remains of the dauphin were buried there. The only evidence to show that the dauphin had been buried there was the leaden coffin which had been dug up and reinterred in 1846. (50). This was again disinterred, and its contents examined.

After examining the contents of the coffin, Dr. de Backer and Dr. Bilhaut concluded as follows: (51)

(1) The iliac bones indicate the subject to have been a male.

(2) From the condition of the epiphyses, humerus, femur, tibia, and cranium, we conclude the subject was fourteen years of age and perhaps more, and the condition of the maxillary bones and teeth corroborate this assertion.

(3) Some bones are soft; there is a slight scoliosis. The thorax is under-developed, and there is a slight left genu valgum.

(Signed) Dr. de Backer–Dr. Bilhaut.
Paris, June 5, 1894.

After examining the skeleton, Dr. Magitot and Dr. Manouvrier, of the School of Anthropology at Paris, reported as follows: (51)

The skeleton which has been submitted to us for examination is that of a subject, probably masculine, about 1 m. 63 cm. high, and between eighteen and twenty years old. There is nothing to show that this skeleton is that of a child who died at the age of ten years and two months.

(Signed) Magitot–Manouvrier.
June 15, 1894.

According to Cabanès all the deciduous teeth of the skeleton had exuviated. Exuviation of the deciduous teeth is usually complete at about the end of the twelfth year.

EMPRESS JOSEPHINE.

The Empress Josephine married Napoleon Bonaparte on March 9, 1796, she being nearly thirty-three, and he twenty-six. When she was thirty-four—"Her somewhat brown and faded complexion was disguised by rouge and powder, which she employed with great skill; the smallness of her mouth concealed the badness of her teeth; she remedied her natural defects by art. The elegance of her figure, her graceful movements, her refined expression, her soft eyes and gentle voice, her dignified bearing, and all the harmony of her person, gave her an exceptional charm." (52)

Bosquet from 1831–44, and Oudet from 1844–48 were the dentists of Louis Philippe. (53)

THOMAS W. EVANS, AND HIS BEQUEST.

Thomas W. Evans, the dentist of Napoleon III (1808–73), was born in Philadelphia in 1823, and obtained his M.D. degree from the Jefferson Medical College in 1843. In 1850 he received the honorary degree of D.D.S. from the

Baltimore College of Dental Surgery, and the Philadelphia College of Dental Surgery conferred the same degree upon him in 1853. Evans was one of the first American dentists to practice dentistry in Europe, and it is said that, at one time, all the European monarchs were numbered among his *clientèle.*

The statement is made that Napoleon III sent Evans upon a confidential mission to President Lincoln during our civil war, and that the result of his mission contributed to influence France not to recognize the Confederate States of America.

After the battle of Sedan, when Napoleon III had been taken prisoner by the Prussians and the deposition of the Napoleonic dynasty was voted in the Corps Législatif, and the Empress Eugénie was compelled to flee from Paris, Evans and some others assisted her. (See bibliography, Nos. 54–61.)

Dr. Evans died at Paris, in 1897. In his will he directed that the residue of his estate be applied to the creation of a dental educational institution to be located in the city of Philadelphia, and to be carried on "as such institutions of learning are now conducted in Philadelphia, and not inferior to any already established." The result of his bequest is the new dental educational institution, The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

There is an old French saying—"The teeth leave when the dentist arrives." Such was the reputation of dentists when the monarchs of France died with few, one, or no teeth, and when uneasy indeed rested the royal head which knew no crown of dentists' fabrication. Happily, today a wiser, truer saying would be—"The teeth cleave when the dentist arrives."

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THE ROENTGEN RAY IN DENTISTRY.

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(Read before the Northeastern Dental Association, at its annual meeting, Hartford, Conn., October 14, 1913.)

THIS is a day of specialism, to the profit of the public! Within the memory of many present, especially those living in smaller towns, the physician did a large part of dentistry, which was extraction; now, hardly a physician is prepared to do even this primitive dental work.

The old time turnkey, of the working of which I have very vivid personal recollections and which was a part of the physician's ordinary outfit, has not been supplanted in the physician's office by the more modern instruments for extraction, but the case is referred to the dentist, and eventually receives the best attention possible from a man making extraction his specialty.

These subdivisions of the work are for the benefit of everyone. The patient receives the most skilful service, and the surgeon-dentist enjoys the knowledge that he has a branch in which he excels the ordinary all-around dentist. There is nothing that gives one as much satisfaction as having done a certain task in the best possible manner.

CO-OPERATION BETWEEN PHYSICIAN AND DENTIST.

As a result of dentistry entering so fully into her own: There was a time, a few years ago, when the dentist and the physician seemed to have little in common; but recently, I notice, we are realizing that dentists and physicians are co-workers mutually dependent upon one another for the fullest success. The dentist is not satisfied to fill the cavities which appear so rapidly in certain individuals, but asks for the cause of such rapid decay. He goes beyond the local condition, and with the physician in consultation questions the process of general metabolism of the patient, the character of his food, and even the condition of his nervous system.

The physician who investigates realizes that the symptoms due to dental conditions are not confined to the oral cavity, or even to the head, as many remote affections have their primary cause in obscure dental abnormalities. Those that are accompanied by pain can be

readily traced, if the physician or dentist is on the alert, but it has been so often demonstrated that dental conditions causing no local symptoms have such grave results in parts quite remote, that such possibilities should more often be investigated than they are. In fact, my experience teaches me that many physicians and dentists do not even recognize this fact.

RELATION OF SYSTEMIC AND DENTAL DISORDERS.

I have been very much interested in the relationship of certain systemic conditions to dental abnormalities and disease. I find that a large number of cases of impacted teeth, as shown by the X ray, are suffering from general nervous diseases, and this interest has caused me to follow up the cases enough to realize that removal of the impaction often cures the systemic disease.

Cases of chorea and epilepsy and disturbances of sleep by dreams come under this head, as well as persistent and invaliding headaches. Again, I believe that there is a direct relation between delayed or entire lack of eruption of teeth and some forms of mental disturbance. This has been written upon by Prof. Henry Upson, a specialist in nervous diseases, and I had before reading his article noted a large number of such cases coming to me from institutions for nervous diseases.

Another line of investigation in which I have been interested through my roentgenological work is the relationship between hypertrophic arthritis, or so-called rheumatism, and dental diseases. I have found that a large number of cases of pus pockets at root-ends, and other necrotic conditions of the teeth, are accompanied by rheumatic pains and hypertrophic bone changes. These were observed in young people, and improvement after proper dental treatment occurred too often to make it a chance occurrence. If these observations are correct they are important, and you as dentists are in a much better position to investigate than I am as a roentgenologist, as you have a better chance to follow up your cases.

It stands to reason, however, that if a chronic follicular tonsillitis or a chronic urethritis, neither of them in themselves of enough moment particularly to attract the attention of the patient, causes rheumatism, a pus-producing tooth-root is as open to suspicion, as it may be equally responsible.

To follow this line of thought a little farther, the above-mentioned rheumatic cases will continue for years, until the pus-producing source is removed, no matter how small in quantity the pus may be. This is particularly true in urethritis, as it is next to impossible to stop the pus secretion, and the case continues as one of rheumatism for years. As dentists, it should be your object perfectly to clear up as promptly as possible the pus-producing tissues under your care.

With such facts in view, let the physician look to the dentist for help more frequently than has been done in the past in general diseases, in order that the cause of such conditions may be found. Dentists should not be satisfied to repair only the teeth that can be inspected with the mirror, but they should learn that the most serious conditions may be caused by lesions which must be investigated by farther-reaching means. To this end nothing will lend as much aid as the Roentgen ray, if properly used and if correct readings of the plates are obtained.

Before leaving this phase of the subject, let me say that I am about to show you with the stereopticon cases illustrative of this general idea, cases including rheumatism, vertigo, persistent headache, hysteria, depressive insanity, and epilepsy, all of which were cured by dental surgery.

THE DENTIST'S CO-OPERATION WITH THE ROENTGENOLOGIST.

I wish to make some general remarks, however, before proceeding to the lantern-slide study of cases. These remarks pertain to the relation of the dentist to the roentgenologist. The latter should be looked upon as a consultant, and not as a specially skilful photographer. It is the end-result that the patient wants, which in these cases is the conclusion arrived at from the plate or plates taken,

as seen through the trained eyes of the roentgenologist—this training being the result of the study of a large number of plates, and the collected experience of a number of dentists referring cases to him. To this end the clinical history and diagnosis of a case should be given to the roentgenologist as a consultant, before he examines the case.

Rays of different penetration are used to demonstrate different conditions. It is a poor X-ray specialist who does not select with care his X-ray tube for each case. A hard or penetrating ray would blot out a delicate cyst-wall, while the same ray would not bring out metal fillings in the best way. The radiographer must be told just what condition he is to investigate. After he has finished with the case, it should be talked over with the dentist.

Whom will the dentist select to make his roentgenological studies? By all means the best man he knows of; the one with the most experience in plate-reading. The cases that are sent are all difficult, else the X ray would not be employed. The dentist must be honest with his patient and help him to obtain the best, which will reflect, in the end, to his own credit.

DENTISTS AS SPECIALISTS IN ROENTGENOGRAPHY.

Here I wish to interject a word that may cause some discussion, not enough however, I hope, to cloud the main issue of this paper. Makers are putting forward small X-ray instruments of the so-called "dress suitcase" type, with a view to inducing dentists to make their own roentgenological investigations. I wish to place myself on record as opposed to this type of machine as being inadequate for the purpose. Most of these give the Tesla type of current, which means that the exposure must be of some length. As a result, the plates cannot have the clearness of outline that is obtained by the more powerful machines. There is a certain involuntary motion of the patient which causes failure of the plate to show the delicate structure of the bone or peridental membrane. In the Tesla type of machine the tube deteriorates with use, and, other things being equal, will never take as good pictures as when the agent sold it. The patient should, therefore, be given the best, and the dentist should buy a powerful machine with a capacity for instantaneous radiographs. To do this, and not be a philanthropist—radiographs being expensive—a man must take a large number of cases, as any type of X-ray machine is so antiquated in three years as to be of no use to a progressive operator. This being the case, it is readily seen that the ordinary dentist should not own an X-ray machine. The ideal way in communities large enough is for one dentist to do this work as a specialty, with competent machinery. This plan is better than for a physician to do this work, as the physician's primary dental education is too defective, and his reading so limited to other subjects that he is not quite up to standard as a dental consultant.

VARIOUS METHODS OF TAKING RADIOGRAPHS IN THE MOUTH.

I wish to say a word in regard to the method of examination. The original method of procedure was to place a photographic film in the mouth, and the X-ray globe outside at as near a right angle to the surface of the film as possible. In this way the shadow of the teeth and surrounding parts was projected on the film, and the developed film showed the various structures. As each tissue has a different density individually, and a change occurs in density in disease, the interpretation was comparatively easy.

This method is yet the best for any conditions, as the film is so near the part to be radiographed that the structure is registered clearly. One of the objections to its use is the small size of the film which is put in the mouth. To make larger films would be of no advantage, as in fitting the mouth the bending of the film makes the undistorted area very small. In some conditions the parts are too sensitive or the jaw cannot be opened widely enough to admit the film. The greatest objection, however, is that, at best, the pictures are shadows, and give one no idea of the relation of the parts except in two planes. The third direc-

tion, to and from the X-ray tube—which corresponds to the eye—is wanting. For example, in such a film a foreign body can be seen, but whether it is in front of or behind a superimposed root, it is impossible to tell.

This can be somewhat overcome by taking radiographs from more than one position, and mentally deducing the relations of the parts. A single view is, with a few exceptions, not enough. I will exhibit examples of radiographs of teeth, showing in one film but two roots, while in another it is evident that the tooth had three roots, one having been superimposed upon the other in the first view.

STEREOSCOPIC RADIOGRAPHS.

We have, however, another method which, when it can be carried out, is far superior. Two plates are taken stereoscopically, that is, the tube is placed on the one side of the head, and the plate on the opposite. The head is tipped away from the tube, so that the ray of light comes under the lower jaw, and the shadow of the side of the lower jaw nearest to the tube is projected up, to be mingled with the shadows of the upper teeth, while that of the opposite lower jaw stands out clearly on the closely approximated plate.

As I said, two plates are exposed without moving the jaw. This is accomplished by means of a special carrier, so that one can be substituted without any change in the position of the patient. The tube is shifted the pupillary distance of two eyes, viz, 2¼ inches, between the exposures of the plates. As a result we have slightly different negatives. The difference is just what it would be in viewing the object first with one eye, and then with the other. As a result, when these plates are put in a stereoscope, and the observer has two normal eyes, the two blend in one view, the third dimension being clearly distinguishable. In other words, it seems as though we were looking directly into the part of the body, and the parts were in their normal relations.

USES OF THE X RAY IN DENTISTRY.

To turn to the more practical side of the subject. In what conditions can the roentgenologist help the dentist? It seems almost foolish for me to attempt to answer the question before this audience of dentists, as you are fully aware of the physical properties of the X ray as ordinarily used, and you, rather than I, have the dental knowledge to adapt the X ray to the special cases to which it may be applied.

It would surprise you, however, to learn that within a short time a dentist with a good practice told me that he did not know that a sinus leading out on the cheek could be demonstrated by the X ray and traced to a questionable tooth. This dentist evidently thought that only hard substances would show, and overlooked entirely the possibility of injecting the sinus with such substances as bismuth paste. A physician also recently said that he had never given it serious thought, but did not know that teeth could be studied by the X ray. Such ignorance seems unpardonable, but it is a fact.

In spite of your superior knowledge of the dental end of the discussion, I will proceed to name briefly the conditions demonstrable by the X ray, and later, after seeing concrete examples by the stereopticon, we can speak more at length of each: (1) Determining whether or not a tooth is of the deciduous or permanent set, when extraction is considered. (2) Investigating for unerupted, impacted, or supernumerary teeth. (3) Orthodontia, showing the operator the entire field in which he is to work, so that he can draw his plans according to the conditions found. (4) Prosthodontia, especially in determining the length and strength of roots relative to anchorage for crown or bridge work. (5) Investigating for pulp stones, pus pockets, necrosis, tumor or fracture of the jaws, dentigerous cysts, etc. (6) Determining the presence of broken instruments or other foreign bodies. (7) Examinations of root-canals and root-canal fillings. (8) Investigation, by means of bismuth paste, as to the source of sinuses with openings either in the mouth or through the skin. (9) Examination of the antrum, as whether or not it is entered by a tooth-root. (10) Investigation upon completion of work,

also many other conditions encountered in everyday practice.

Many refinements of this work could be discussed if time permitted, such as the use of bismuth paste for tracing sinuses, metal filaments as markers for painful points, and the use of colorgal in testing the separation of the peridental membrane, but I would simply say in closing that the employment of the X ray in dentistry is scientific, safe, and sure.

CONCLUSION.

The diagnostician, Dr. Shattuck of Boston, in a meeting a short time ago, speaking of the advance achieved in X-ray work in the medical field, made the following statement, which applies to dentistry as much as to medicine: "I believe those who value precision should check up their work by X-ray examinations, when many sources of error now unknown would be discovered."

The members of the dental profession owe it not only to their patients, but to themselves as well, to avail themselves of this positive diagnostic agent whenever there is the slightest shadow of doubt either as to the exact condition presented or as to the proper manner of procedure.

DENTAL CLINICS IN MANILA.

By LOUIS OTTOFY, D.D.S., Manila, P. I.

PREVIOUS reports of these clinics were made as follows: To April 1, 1910 (see DENTAL COSMOS, August 1910). To April 30, 1911 (*Ibid.,* October 1911). To July 30, 1912 (*Ibid.,* November 1912). The present report brings up the data to December 31, 1913.

There are at the present time three regularly organized dental clinics in operation in Manila: One at the Philippine General Hospital, one at St. Paul's Hospital, and one at Bilibid (federal) Prison. I established and conducted dental clinics in the public schools, the School for the Deaf and Blind, St. Luke's Hospital, and in such charitable institutions as the Girls' Orphanage and the Home of the Holy Child. In some of these institutions a clinic was established temporarily—that is, until the inmates had been cared for—while the work in the public schools has had to be temporarily suspended for want of funds to carry on the work.

Aside from the institutions and the cases covered by this report, some dental services are rendered, principally extractions, in the various health stations of the Bureau of Health, at St. Luke's and other hospitals, and one clinic supported in part by the Philippine Dental Society. Of the work done in the last mentioned, no data are available for this report.

The dental clinic at the Philippine General Hospital was opened in August 1913. This hospital, strange as it may seem to people who consider the Philippines some worthless islands scattered in the Pacific Ocean, is one of the best-equipped in the world. Its free dispensary, opened only a few years ago, takes care of more than 80,000 patients per annum. In the dental clinic, the average number of cases treated per month, since it was opened, has been 157—a total of 2677.

These clinics are not only of immense value to the poor of the city, by whom they are highly appreciated, but they also serve to educate the people along the lines of dental prophylaxis and hygiene. It is the rule in all of them to give services freely to all who are suffering, without any question of their ability to pay for it. The clinic at the Philippine General Hospital is aided by funds of that institution, augmented by moderate fees exacted for such work as

crowns, bridges, fillings, dentures, and the like. The clinic at St. Paul's Hospital is barely self-sustaining, a similar method being employed of exacting a moderate fee for the class of operations mentioned. At the prison there is hardly any income, but we have a fair dental equipment, and with the aid of

DENTAL OPERATIONS PERFORMED IN THE VARIOUS DENTAL CLINICS OF THE CITY OF MANILA, P. I., FROM MAY 1, 1905, TO DECEMBER 31, 1913.

(*Under the charge of* LOUIS OTTOFY, D.D.S., *Manila.*)

—	St. Paul's Hospital.	Philippine General Hospital.	Bilibid Prison.	Public Schools.	St. Luke's Hospital.	Girls' Orphanage.	School for Deaf and Blind.	Home of the Holy Child.	Grand Total.
Treatments	8,698	6,354	1,557	1,381	1,033	176	21	43	18,263
Extractions	6,790	1,685	1,122	16	281	2	9	..	9,905
Amalgam fillings	365	191	3	1,321	125	103	13	33	2,154
Cement fillings	431	41	24	503	63	35	4	7	1,108
Gutta-percha fillings	435	13	12	213	73	3	2	..	751
Gold fillings	31	10	2	...	...	..	..	..	43
Cleaning cases	87	36	16	37	1	9	..	1	187
Vulcanite dentures	144	3	6	...	3	..	..	..	156
" " repaired	5	...	...	...	...	..	..	..	5
Gold crowns	341	96	26	...	3	..	..	..	466
Porcelain crowns	95	5	1	...	...	..	..	..	101
Richmond crowns	4	...	...	...	...	..	..	..	4
Bridges	240	18	12	...	1	..	..	..	271
Regulating cases	2	...	...	...	...	..	..	..	2
Prosth. noses	6	2	...	...	...	..	..	..	8
" upper lips	1	2	...	...	...	..	..	..	3
" lower lips	1	...	...	...	...	..	..	..	1
" ear	1	...	...	...	...	..	..	..	1
" eye and part face	...	1	...	...	...	..	..	..	1
Fract. mandible, treatment	...	1	...	...	...	..	..	..	1
Obturator, cleft palate	...	1	...	...	...	..	..	..	1
Total	17,677	7,459	2,781	3,471	1,583	328	49	84	33,432

SERVICES RENDERED IN THE VARIOUS DENTAL CLINICS IN MANILA, FROM MAY 1, 1905, TO DECEMBER 31, 1913, INCLUSIVE.

Number of Patients served.

St. Paul's Hospital	7536
Philippine General Hospital	2677
Bilibid Prison	1383
Public Schools	940
St. Luke's Hospital	336
Girls' Orphanage	73
School for the Deaf and Blind	18
Home of the Holy Child	14
Total	13,027

Sex.

Male	8767
Female	4260
Total	13,027

Race.

Filipinos	12,670
White	253
Chinese	64
Japanese	25
Hindoos	8
Negros	4
Turks	2
Syrian	1
Total	13,027

one of the prisoners it is hoped to increase the work of that clinic.

At first there was some opposition on the part of dentists who did not fully understand the scope of these clinics, but practice has demonstrated that they are not only not injurious to the practitioner, but actually a benefit to him. Many who otherwise might not consult a dentist at all are lured to these institutions in the hope of getting something for nothing. A close inquiry is made, especially at the government hospital, into the ability of the applicant to pay ordinary fees, and in case of ability to pay, the services of the clinic are denied to them. But having been informed of the condition of their teeth, they seek dental services elsewhere. Then, again, while some visit these clinics a few times, they find it unpleasant to come in contact with the poorer people of all classes and afflicted with a multitude of ailments, and decide to pay a larger fee to the general practitioner rather than mingle with the motley crowd.

The accompanying tables are self-explanatory.

It will be noticed from the tables (opposite) that the beneficiaries of these clinics are almost exclusively natives, less than 400 out of 13,000 being of other nationalities: Whites (including Americans, Spaniards, Germans, Portugese, French, etc.), Chinese, Japanese, Hindoos, Negros, etc.

In the table of dental operations performed, attention is also directed to the prosthetic facial work of these clinics. They include a number of noses—lips—a case of an eye, ear, and cleft palate. Some of them have an interesting history, and they will be illustrated and described in a future article devoted entirely to that subject.

ORAL PROPHYLAXIS BY DIET.

By WILLIAM R. POND, D.D.S., Rutland, Vt.

(Read before the Vermont State Dental Society, at its annual meeting at Burlington, Vt., May 21, 1913.)

A NUMBER of years have passed since the wonderful research work of Miller and others proved to the world at large, and to the dental profession in particular, the *cause* of dental caries—and yet we are still groping for a *cure.* The mechanical side of our profession has developed to a wonderful degree, a degree nearing perfection. In fact, we have expanded in scientific lines and in all other ways. The dentists today are saving millions of carious teeth, treating successfully oral diseases and malformations of all kinds, doing oral surgery with marked success, and correcting malocclusions. In fact, we are working hard to produce normal oral conditions and to reduce the rate of decay in teeth.

But what progress are we making toward a *cure,* toward truly prophylactic treatment, toward the elimination of dental caries? The medical profession is working toward cures, toward immunity, and, viewed in this light, our own profession has gone a bit lame in the march of progress. From the present tone of our dental literature, however, and from the investigations of our oral hygiene committees, it would seem that we are about to get a start in the right direction. And what is that right direction? From a practical standpoint, and by the process of elimination, we can

unhesitatingly say, "Diet." This subject, in its many practical phases, is what I propose to dwell upon.

THE MECHANICAL PHASE OF DENTAL PROPHYLAXIS.

For a number of years we have listened to papers and seen clinics on oral prophylaxis, on cleaning and polishing teeth. We have profited by them and have obtained results from their teachings, and it is not in a spirit of criticism that I ask, "Is this form of prophylactic treatment the real fundamental principle of the prevention of diseases of dental origin?" Certain it is that, if we lived correctly in regard to diet and habits, there would be very little need for prophylactic treatment of this nature. I will quote the following from Dr. Kirk: "Has it come to pass, in the economy of God Almighty, that humanity, in order to live, to retain its dentures in a state of integrity, must make a never-ending fight with the tooth-brush? Is there anything else we have to do in the struggle for existence that is at all comparable with this thing? Would it not be a very bungling piece of work on the part of dame Nature for her to make it necessary that, in order to survive to the extent of saving our teeth, we must continue to depend upon these mechanical means? Immune individuals do not; why, then, should anyone?"

DIET IN ITS BEARING ON DENTAL CARIES.

According to Black, the texture and the form of teeth have no bearing on their liability to decay. Environment is the keynote. There is a proper diet for maintaining a clean and healthy condition of the teeth and gums, and there can be no question about the possibility of a diet so well balanced that one would attain the highest nutritional efficiency, and, with this theoretical diet, an immunity to dental caries. This diet will produce and stimulate the normal quality and quantity of saliva, and will not be dependent upon a waste product like potassium sulfocyanate for its efficiency in producing immunity.

"The food problem in chronic disease is now considered much more important than all the other factors combined." This will make a good text for our further consideration, for the food problem is as important to dentistry as it is to the medical profession.

EFFECTS OF CARBOHYDRATES ON TEETH.

There can be no question of the fact that most of our dental disorders are fundamentally produced by *what* we eat, and *how* we eat it. The number of people in the larger communities who live almost entirely from bakers' shops is astounding. They live on pies, cakes, doughnuts, and fresh bread, with numerous sweets and syrups. This is a strictly carbohydrate diet, and considering the fact that the bread is always fresh and soft, and that the foods are usually washed down with liquids, such as tea, coffee, etc., it is easy to see where the teeth come in, or rather—come *out*. Nature, the great economist, will not support anything which is unnecessary, and people who live on this diet do not need teeth, and I may say, do not have them long.

CITY DIET.

In making public school examinations in New York City, it was found that in certain districts the children were fed principally upon bakers' buns and tea. Needless to say, these were the districts where the worst dental conditions prevailed. In the sections inhabited by the more recently arrived immigrants the diet was of a coarser, harder, and more nourishing nature, and the oral conditions were accordingly better. But how easily the newly arrived immigrant, who has lived on coarse, hard foods in his own country, takes to our carbohydrate diet, and even goes us one worse by taking entirely to starches and sugar! How quickly their splendid dentures go to pieces as a consequence! This situation is both pitiable and lamentable, for aside from the dental conditions, this diet will not raise healthy, wholesome American citizens.

COUNTRY DIET.

So much for large community conditions, but I do not intend to let the ruralists go without a word. The diet of our rural communities is as bad or worse than that which has been spoken of in regard to the poorer classes in the cities. The rural diet is similar to that mentioned, except that it is homemade, and in some instances, doubtless, is even less wholesome, and to this diet is added the omnipresent pigmeat, almost to the exclusion of other meats. The farmer of today is too apt to sell his good things of the food variety, and to bring up his family on what cannot be converted into money! How many times one may observe, if he is interested, a ruralist bringing his chickens, eggs, butter, cream, and vegetables to the market, only to buy his own lunch of cookies and buns from the bakery. I have visited dairy farms where the milk on the table was of the "skim" variety, and the butter of the poorest.

And alas! for the ever-present pie, doughnuts, and other foods of like nature—I will draw the curtain quickly on this distressing scene. I have been to lumber camps where the food was wholesome and of the best, but the men would eat a hearty meal in five minutes, washing down the food with liquids, and masticating practically none of it. They need no teeth for that sort of thing, and consequently have practically none. The man who thinks good teeth are common in our rural districts has not studied the situation.

I am not familiar with the situation in the South, but have no doubt that the dental conditions among the ignorant and poor would prove similar to those already described. The deterioration of the negro race is certainly a fine example of the result of poor food and improper habits—and this applies, among other things, to their teeth.

NECESSITY OF HARD, FIBROUS FOODS.

One of the most universally practiced dietary habits which is bad from a dental standpoint is the use of soft foods to the exclusion of practically all foods of a hard or fibrous nature; and this directly and indirectly has a vast influence on the lamentable dental conditions today. The teeth must have vigorous use, and the oral tissues their needed amount of massage, in order to create and maintain health of the mouth. The action of hard foods in chewing is nature's system of cleaning and polishing the teeth and massaging the gums. It also creates a normal flow of saliva, and thus properly performs the first process of digestion. "The quantity of saliva secreted during feeding is in direct proportion to the dryness and hardness of the food," it is stated in "Kirke's Handbook of Physiology."

PERNICIOUS HABIT OF DRINKING WITH MEALS.

No amount of artificial cleaning and polishing can entirely compensate for the lack of the natural process. Many of our cases of malocclusion are simply the result of undeveloped mouths which have not been given enough use in masticating food to stimulate bone development and to create normal arches. Such mouths have not been given enough use to cause even a normal shedding of the deciduous teeth. Many experiments have proved that lack of use of the teeth prevents normal development of the bones of the head and other parts of the body. The habit of washing down food with tea, coffee, milk, or water not only prevents proper use of the teeth, but also prevents proper insalivation. How almost universal is this habit of using liquids to assist in the swallowing of food! I do not care to enter extensively into the subject of the use of water with meals, and will only say that from a dental standpoint it is a most pernicious habit, especially in children. It often prevents them from learning, to the fullest extent, the proper mastication of food. Theories have been advanced by the medical profession regarding water-drinking with meals as an aid to digestion, but the following quotation from Dr. G. C. Smith's book, published in 1912, "What to Eat and Why," seems to be most logical: "Formerly an excess of water was thought to increase the

waste of the body and to cause breaking down of the body proteins, but this has been disproved. It is, however, self-evident that continued use of large quantities of drinking-water in excess of the body requirements would soon impair the functions of the various organs by increasing the volume of blood in circulation, thus embarrassing the heart's action, lessening the activity of the digestive juices, causing indigestion—often the first factor in the series leading to faulty metabolism."

EXCESS OF CONSUMPTION OF SUGARS AND OF SOFT AND HOT BREADS.

We can rightly include the habits of overeating and overdrinking among the dietary conditions having a dental phase. Much could be said on this subject, and also on the fact that the United States consumes one-fifth of the world's output of sugar. This last statement speaks for itself. The use of the bolted wheat flour for bread, to the exclusion of the coarser and harder breads, is another evil with which we are all familiar, and the fact that nearly all breads are eaten fresh and soft adds to this evil. Hot breads can be classed in the same category.

PUBLIC INSTRUCTION IN DIET NEEDED.

It would be futile to enumerate all these evils, if it were not possible to work toward a betterment and possibly a cure for them. Much is being done toward the education of the masses to a higher realization of the need for sanitary precautions. Considerable progress has been made along dental lines in a general way, but, from all viewpoints, we must have more wholesome diet. What a fine practical work the settlement workers are doing in this line, when they teach the poor how to make the money go farther in buying and cooking wholesome food, and show the people how to live better on less money! This, it seems to me, is practical philanthropy.

As in many other situations, our best chances for results on dietary lines lie with the children. How necessary it is for children to be properly fed in order to get proper physical and mental development, and how easy it is to guide them into proper courses of habit before they have gotten into bad ruts. If left to their own devices, children will take to the carbohydrate diet, the diet of sweets and starches, to the exclusion of the nitrogenous foods and all else. But, properly led, they can be as easily taught to like all wholesome foods and can be brought up on a properly balanced diet. Even among the very poor, there are wholesome and sustaining foods which can be substituted for the extremely inadequate diet commonly in use, without added expense to the cost of living. Above all things, let these children be taught to *use* their teeth, and this can be taught by proper feeding. As a first aid in teaching proper mastication of food, I would suggest the elimination of the soft cereal and the handy cup of drink. How long a process is that of dentition, and how necessary it is, even from a purely dental standpoint, that children and young people be properly fed and nourished! Then, too, these good habits formed in youth will stick through life.

DENTISTS AS DIETICIANS.

We, as dentists, need education on dietetic lines. We need to know what a well-balanced diet is, what will be adequate for producing the best results from out standpoint. And what will produce the best results from our standpoint will produce the best general results, and will be for the betterment of the race. Physicians rarely take into consideration dental needs when recommending a diet, so the dentist must speak for himself. Otherwise healthy children suffer from carious teeth, and thus are, strictly speaking, cases for the dentist to prescribe for on dietary lines. It is on this line that we must work, if we are to progress further in elevating our profession above mere mechanics. Our mechanical ability will save teeth and reduce their mortality, so to speak, but it is on the lines of correct diet and clean living that we will reach our highest goal of prophylactic treatment in dentistry—that of immunity to dental caries and to general oral diseases.

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, L.D.S.Edin., Edinburgh, Scotland.

(I.)

CHAPTER I.—INTRODUCTORY.

THE following papers have been written with the object of proving the superiority of tube teeth and porcelain rods, both as regards the principle of their attachment and their practical application in the various classes of prosthetic work. At the same time it is hoped that they will do something to stimulate artistic as well as manipulative dexterity, and lessen the ever-increasing number of new forms of crowns so persistently being brought forward. This multiplication of forms is leading to much confusion and unnecessary trouble and expense. Moreover, these individual forms of crowns have a very limited range of usefulness, even when they are supplied in a large range of sizes, shapes, and colors. In fact, their use is practically confined to crown work and some cases of bridge work, whereas tube teeth and porcelain rods call for no more than a very limited selection of forms, sizes, and colors in order to supply the necessary materials for forming almost any type of tooth, crown, porcelain bridge, or gum tooth section, and with far better results, both artistic and mechanical, than are obtainable by any single type of tooth or crown, or probably by any combination of them.

In addition to tube teeth and porcelain rods, the writer suggests a revival in the use of single gum tube teeth and gum teeth sections. These have not been manufactured for the past forty to fifty years, and so have been unprocurable. The employment of these in connection with the casting process would open up a new field in prosthetic work, and permit of practically all of the advantages derived from the use of continuous gum work being obtained in as simple and easy a manner as by the use of vulcanite with gum sections, and yielding far better results in most cases. In addition to their use in the manner suggested, they could with advantage be made to supersede the present forms of gum teeth and sections in vulcanite work, and doubtless they would once more attain the popularity which they enjoyed previous to the introduction of vulcanite as a base.

The following chapters are not given as a full exposition of the subject, but doubtless they will suffice to make clear the main points. The writer hopes to deal with the matter more in detail later on.

While it is impossible to produce evidence of when and by whom the first tube teeth were made, it is fair to assume that they were among the earliest forms of porcelain teeth employed in dentistry. Anyhow, there is presumptive evidence for the reasonableness of this conclusion when one remembers that one of the earliest methods of teeth substitution and replacement was the use of the natural teeth fixed either upon the root of a tooth or on a base or plate, and that the general mode of attachment of these teeth to the natural roots or artificial base was by means of a pin or post passing through a hole or tube formed in the tooth, which was carried either through the body of the tooth entirely

to its grinding or occlusal surface, or sufficiently far to admit of a strong enough post to hold the tooth secure in its place. Indeed, one of the earliest records of a pivot tooth, or as we now call it, a crown, is to be found in Fauchard's work "Le Chirurgien Dentiste; ou, Traité des Dents," published in 1726.

It is, however, certain that M. N. Dubois de Chemant, a Paris dentist who practiced in that city in 1788, and who was one of the pioneers in the making of porcelain teeth, by some means came into possession of the process of an apothecary of St. Germain named Duchateau, who in 1774 was led to study the subject of porcelain teeth by the "unbearable condition of his own artificial teeth of bone," and who communicated his discovery to the Academy of Surgery in 1776. Duchateau's invention seems to have fallen into disuse until taken up by M. N. Dubois de Chemant, who took out a patent for the process of making artificial dentures and teeth of mineral paste, to which he applied the name of "incorruptible." Duchateau formally claimed priority of invention, but lost the case, and De Chemant, failing to popularize the new production, removed to London, where he obtained the exclusive right of working the invention for twelve years. He published various editions of his work, the first apparently in 1788. An illustration from the fifth edition is given in the S. S. White Catalog of Porcelain Teeth, where also may be found much valuable information regarding the early history of these teeth.

In De Chemant's work, "A Dissertation on Artificial Teeth," published in London in 1804, appears the first description of tube teeth (page 34, 4th edition): "In the teeth of unalterable mineral materials, the holes which receive the pivots are square, and cannot become larger, which renders them very firm, and besides, as they are riveted they can never separate from the teeth. I can even solder them to the artificial pieces when necessary."

From this it will be seen that De Chemant must have made teeth with square tube-holes through which passed square posts attached to the artificial denture, enabling the teeth to be riveted on their occlusal or lingual surfaces; or the teeth might first have the post fixed in them by riveting the occlusal or crown and the base soldered to the plate. Like most old-time authors, De Chemant tells one everything except "just how to do it."

In America tube teeth were first manufactured in 1822, by Mr. Charles W. Peale, who practiced dentistry in Philadelphia. He was soon followed by many others, and by 1838 mineral teeth had come into general use both in America and Europe. Among the pioneers in the former country were Samuel W. Stockton in 1825, D. C. Ambler of New York and J. R. Spooner of Montreal in 1828, and in 1837 Elias Wildman of Philadelphia and Dr. J. E. M'Ilhenny, both of whom did much to further the improvement in the manufacture of porcelain teeth. These workers made single tube teeth or carved blocks with tubes through them to take gold rivets whereby the teeth were attached to the plates; but these were discontinued for insufficient reasons, as were also carved tube blocks, though these latter were in use for a much longer period, probably until the introduction of vulcanite. At the same time neither the single tube, gum tube tooth, or gum tube sections were manufactured except by practitioners for their own use.

The history of tube teeth in England is associated with the early beginnings of Messrs. Ash, Sons & Co. and Messrs. Lemale, both of London, and possibly others who commenced the manufacture of tube teeth in 1837 and have continued to carry it on up till now. These were made for use in plate work, though they were occasionally used for crowning the upper front teeth, and were made with a metal tube baked in the body of the tooth. From 1837 to 1855 gold was used for the tube. At a later date platinum was used because it allowed of a higher temperature in firing the porcelain, and at that time it was much cheaper than gold. It seems strange that one of the reasons why platinum should displace gold for tubes was on account of its

price, but when one considers that at that time platinum was about $4.50 per oz., whereas now it is about $50.00, one ceases to wonder. The platinum tube was seldom an advantage in point of view of color. Formerly one color only was used and the body was more fusible and not so highly glazed. Coincident with the introduction of the platinum tube, however, two colors have been used. The principal reason for the use of the metal tube was that, at the time tube teeth were introduced, there was no cement on the market—only sulfur, which adheres to metal better than to minerals. It has since been found that, provided the glaze is removed from the surface of the tube as is done in the modern non-platinum tube tooth, the attachment by means of sulfur or one of the cements is entirely satisfactory.

Most of the old-time dentists in England continued to make their own teeth, both plain and gum, as well as gum sections, up till about 1865. A few of them made single tube teeth with half-round platinum tubes which did not pass quite through the tooth; doubtless the idea was to prevent rotation, but this was quite unnecessary, and, as we shall see later, limited the usefulness of the teeth in other ways.

While the tube tooth, better known as the English tube tooth, is unfamiliar to many American dentists, its use has never been discontinued by the best class of British practitioners. Fortunately there are signs of reviving interest in these teeth; indeed, the surprising thing is that interest should have declined, and while the causes which have combined to displace tube teeth from favor cannot be accurately stated, generally speaking they are those which contributed to the decline in the use of single gum teeth or sections for plate work, and these causes largely resulted from the introduction of vulcanite as a base. Coincident with the rapid advance in favor of this material was the increased demand for teeth. This demand the manufacturers were in the position to take advantage of; and as the comparatively few dentists then in practice found they had more work than they could well overtake, they gladly abandoned the irksome task of making their own teeth and were content to depend on those workers who had made it their business and who could furnish them with a better and cheaper article, and at the same time offer a wider selection. Thus the enthusiasm for these new forms of flat teeth which could be employed for all purposes was shared by dentist and maker alike. There can be little doubt that the defective character of the grinding wheels then in use was also a powerful factor in helping to diminish the popularity of tube teeth, as these called for much grinding and fitting. Other causes were no doubt instrumental in bringing about the change. In consequence the tube tooth fell into comparative obscurity, as did the other forms spoken of.

Generally speaking, writers refer to the tube tooth as being out of date, but in reality the reverse is the case. After all, what are the latest forms of detached post crowns but tube teeth? and to what else do they owe their claims to superiority over their fixed post rivals, but to this very tube principle? This, as has been pointed out, consists of a pin or post* passing through a hole or tube formed in the body of the tooth. It is true that in most detached-post crowns the tube does not pass right through the tooth body—and this constitutes one of their principal weaknesses, as will be shown later. Suffice it to say meanwhile that ample proof is afforded of the endeavors which are being made to improve upon the principle of the tube tooth, one of the outstanding features of which is that the post fits the tube accurately, and such endeavors at improvement are furnished by a study of the rise and progress in popularity of the pivot tooth or modern crown, as it is recorded in works on prosthetic dentistry. A

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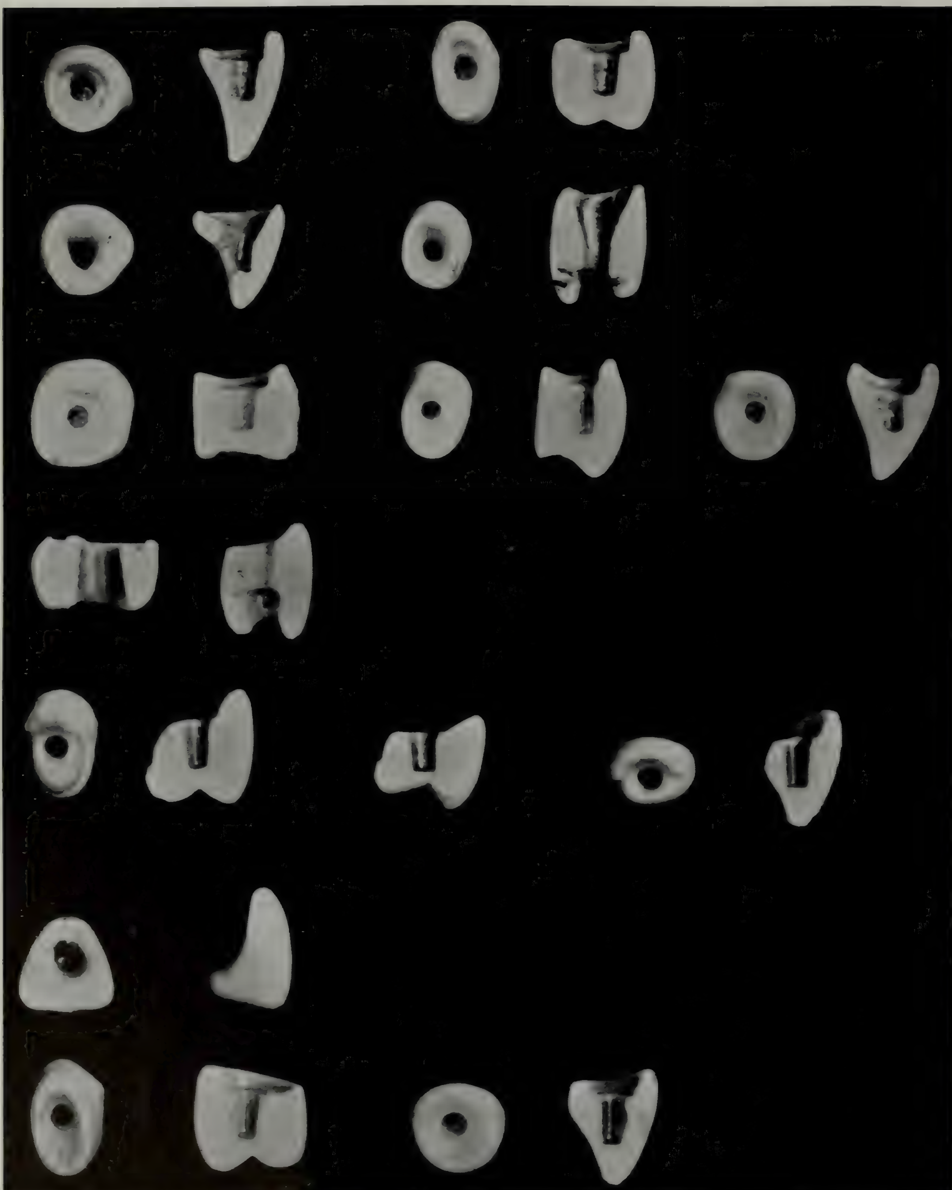
* When the tube tooth is referred to in crown or bridge work, the term "tube crown" or simply "crown" is generally used instead of "tube tooth," as in plate or vulcanite work. When the term "post" or "dowel" is employed, it refers to its use in crown work, whereas when the term "pin" is employed it refers to its use in plate work.

study of these. as well as an article in the S. S. White Tooth Catalog entitled “Detached-post Crowns: Some Interesting Steps in Their Development,” is instructive. These are written with the object of proving that a great advance has been made in the manufacture of porcelain crowns. and in proof of this

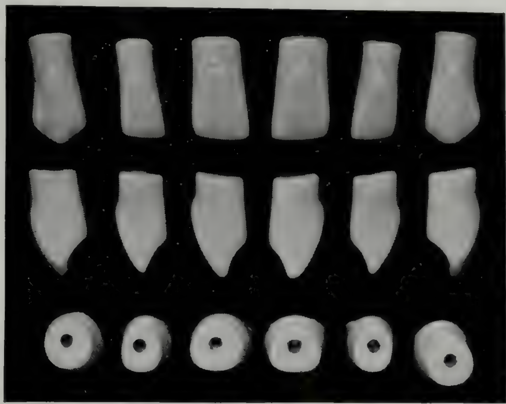
Fig. 1.



A, White's detached-post crown. *B*, Gates-Bonwill crown. *C*, Ash's dowel crown. *D*, How dovetail crown. *E*, Goslee crown. *F*, Foster crown. *G*, Davis crown.

the old form of all-porcelain pivot tooth, commonly called the wood pivot, which was much in use some thirty or forty years ago, is made the starting-point from which the advance is supposed to have taken place culminating in the modern form of detached-post crowns.

FIG. 2.

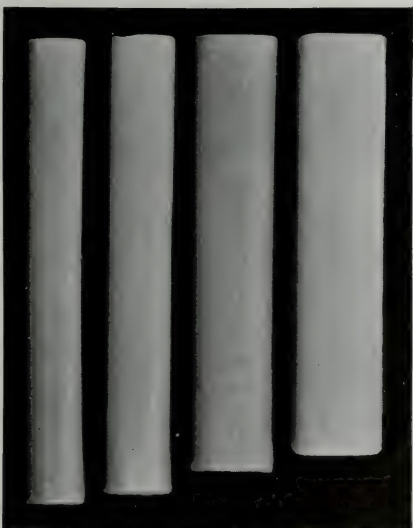


Showing tube teeth too small in base for crown work.

A careful study of the article already spoken of* has failed to convince the writer that any improvement has been effected in the more recent forms of crowns. In fact, some of the illustrations show transition types which are markedly retrograde—points to be noted with regard to these are the size and position of the tubes and the deficiency in the thickness of the porcelain upon the lingual surface; but the subject will be dealt with in detail later. Meanwhile attention is directed to Fig. 1, showing

FIG. 3.

A



No. 22. No. 23. No. 24. No. 25.

B

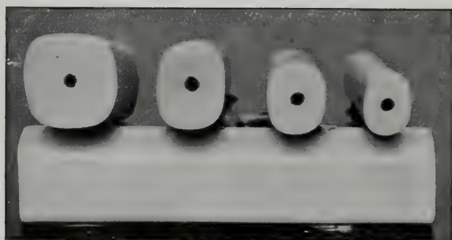


Fig. 3 shows single tube rods. *A*, Side view. *B*, End view.

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* S. S. White Tooth Catalog, page 32.

photographic sections of some well-known crown forms.

With regard to the manufacture of porcelain teeth in general, and not to tube teeth in particular, while makers claim that their teeth and crowns are better made than ever before, those of us who have had the opportunity of using teeth made thirty or forty years ago, and who are fortunate enough to still have some of these old-time teeth, realize that their claims are not well founded. From the point of view of standardization of color and the great increase in number of new shapes and forms, etc., there may be improvement, but for lifelike appearance and strength the older bodies were superior. These, indeed, might be termed "tougher," or less brittle. One of the reasons for this toughness was that the prevailing practice was to allow the teeth to cool down in the muffle until stone cold; from twelve to twenty hours being allowed for this cooling process. Such a method was, of course, expensive as regards fuel. The stress of modern competition has resulted in quicker but less satisfactory ways of annealing.

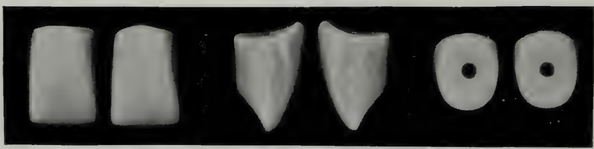
Fig. 4.

A B

Shows—A, Pin in correct position. B, Pin too near edge of plate.

Fig. 5.

Fig. 6.



Figs. 5 and 6 show special forms of broad-based teeth.

CHAPTER II.—Forms of Tube Teeth and Porcelain Rods.

In the introductory chapter claims have been advanced in favor of tube teeth as superior to other forms, and before proceeding to elaborate these, a

fuller consideration of the materials at our disposal seems to be called for. These consist of—(1) tube teeth with platinum tubes baked into them (Fig. 2); (2) non-platinum tube teeth in which the tubes are not lined with platinum, as their descriptive name implies; (3) non-platinum single and double tube rods (see Figs. 3 and 16).

Regarding the first class, those with platinum tubes may be termed the old style of tube tooth, which has been on the market since 1837, and up until 1856 was made of one color of porcelain throughout. Since 1856 and up to the present time they have been made in precisely the same way as all other forms of poured teeth, and can be had with or without platinum tubes. These non-platinum tubes are formed by the insertion of pins in the molds before the teeth are fired, and are afterward reamed out true in such a manner as to insure the tube being straight and parallel throughout. The result is an unglazed tube which gives ample hold to either cement or sulfur, and whatever need there may formerly have been for a metal tube is entirely done away with. As there seems to be no special advantage gained by the use of the platinum tube, which adds nothing to the strength of the tooth—though it has been claimed for it that it does—it seems probable that in future only the non-platinum tube teeth will be called for. The body is formed of two colors, graduated from the neck to the cutting and grinding edge, as in other forms, and a large selection of shades is afforded. These teeth, however, exhibit certain defects, which will be seen by referring to Fig 1, and which are most marked in the incisors and canines. Almost without exception the bases will be found to be too small. In consequence it is impossible in nearly all cases to cover the root completely when the aforesaid forms are used for crowning; but this defect does not prejudice their use to the same extent when employed in plate work, or when vulcanite is used as a base, as there is not generally the same necessity for a large body of porcelain as when a cap or root has to be covered. There are exceptions, however, such as when any or all of the front teeth have to be set on the gum, or where a single tooth has to be set between adjacent natural teeth. In such cases the smallness of the porcelain base of the tooth would necessitate the pin being soldered almost to the edge of the plate, with the result that the plate, when filed away sufficiently to conceal the gold, would be rendered too weak, and in consequence the pin would be liable to break off (Fig. 4). In these cases, therefore, it

FIG. 7.

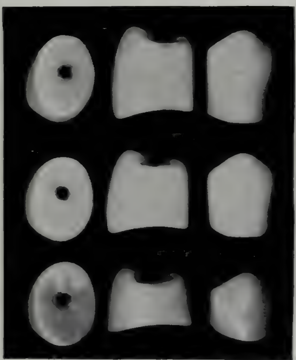


FIG. 8.

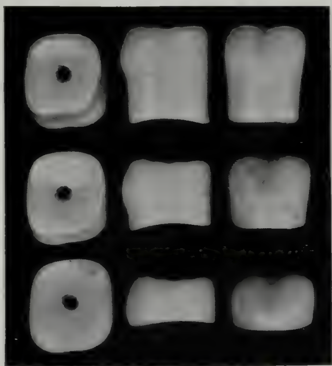
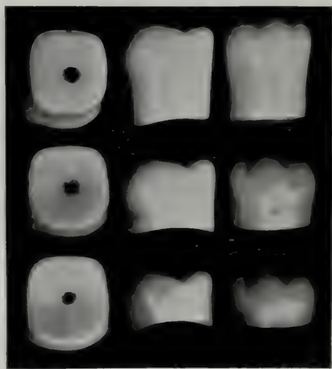


FIG. 9.

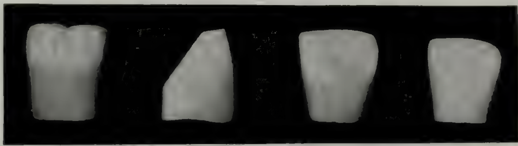


Figs. 7, 8, and 9 show special forms of broad-based non-platinum bicuspid and molar tube teeth.

is better to use one of the special forms of broad-based teeth (Figs. 5 and 6), or they may be shaped up from porcelain rods.

Special forms of bicuspids and molars were designed and suggested by the writer some twelve years ago to surmount the defects already spoken of, and sometimes too short. Moreover, the disposition of the two colors of which these were formed, while suitable in all respects for the purpose for which they were designed, precluded satisfactory results always being obtained when they were thus cut up. In consequence, the large special forms of non-platinum

FIG. 10.



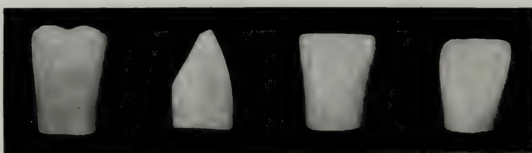
A B C D

A. Special form of non-platinum tube molar. B, C, D. Stages in the formation of central crown. Note breadth of space.

they were made large enough in the base to cover most capped molar and bicuspid roots (Figs. 7, 8, and 9). These, used primarily for this purpose, came to be employed for supplying the raw material from which to form front tooth crowns (Fig. 10), but of course only the larger sizes, as previous to this tubed front teeth (Figs. 5 and 6) became a necessity.

These (Fig. 5) were purposely made large enough to meet all cases, and were necessarily much too large for most, and so the smaller size of front teeth (Fig. 6) was designed with the object of still further reducing the amount of grind-

FIG. 11.



A B C D

A. Old form of platinum tube teeth. B, C, D, Stages in the formation of a central crown. Note base—often too small.

the only teeth which afforded sufficient material for forming these front teeth crowns in most cases were the older forms of platinum tube molars and bicuspids. But even these older forms when shaped up to form incisor crowns, in some cases proved too small in the base (Fig. 11), while the special forms, while large enough in the base, were ing necessary. These have a large enough base to cover most roots, while the larger size will easily cover any capped root. The two extra large bicuspids and the extra large molar (Figs. 12, 13, and 14) were designed for crowns requiring exceptional contour, and the bicuspids have proved useful for forming centrals, laterals, large canines, etc. Fig. 15 will

show how little grinding of the lingual cusp and labial surface is necessary to convert these into the largest size of canine, large centrals, and laterals. Moreover, the relationship with regard to the proportion of color between the upper and the lower part of these teeth allows of extensive variation. For instance, when one of these is shaped up, if the upper half of the tooth be brown in color, while the lower half is gray, then the proportion between these can be maintained by grinding an equal length off both the cervical and incisive edges. On the other hand, if the color of the upper half of the tube tooth should require to be most in evidence, then a corresponding amount can be ground off the incisive edge. Or it may be that the color of the lower half of the tooth is preferred, in which case most should be ground off the upper half. In such a case, unless the tooth required is an extra-long one, this can be done.

From the foregoing, then, it will be obvious that by the system of shaping up teeth from what are practically rough forms, an extended range and an amount of freedom is obtained with regard to color, shape, and size, which even without the addition of the non-platinum tube rods is unobtainable by any other means. With a view to setting the reader's mind at rest with regard to what may appear a lengthy and possibly difficult means of attaining the results claimed, it may be as well to mention at once that it is proposed to deal with the shaping up and fitting of tube teeth and porcelain rods in a subsequent chapter, where it will be shown that neither as regards time nor skill is this matter of grinding so formidable as it might at first appear. Much of what one reads and hears regarding the time and labor involved in grinding teeth is no doubt due to the lack of appreciation of the advantages now afforded by the great improvement in recent years in the materials and appliances for this purpose, as well as lack of knowledge of the means whereby these may be employed in order to obtain the best results. The

Fig. 12.

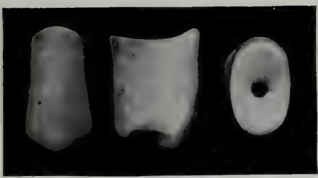


Fig. 13.

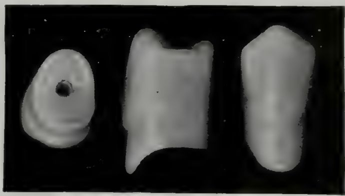
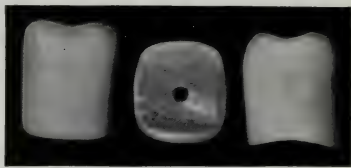


Fig. 14.



Figs. 12, 13, and 14 show extra-large non-platinum tube bicuspid.

Fig. 15.

Shows extra-large bicuspid used to form central, lateral, and canine.

reluctance which is even now shown to doing more than the minimum amount of grinding has doubtless resulted from the above and from recollection of the days when wheels were of the poorest and the power-driven grinding lathe unknown. Under these conditions it is not surprising that the smallest amount of grinding was looked upon as a serious matter, and one to be avoided as much as possible, especially when one remembers that even the foot-driven grinding lathe was not the perfect machine it has since become. The legitimate prejudices thus engendered seem to have remained with us long after the causes which gave rise to them have been removed. Such feelings die hard, and doubtless the profession will take time to realize fully the advances which have been made. There was compensation, however, for such disadvantages as were suffered in connection with these defective appliances, in the improvement which was made in the manufacture of some of the forms of porcelain teeth and the immense variety of these which were put at our disposal.

Non-Platinum Tube Rods.

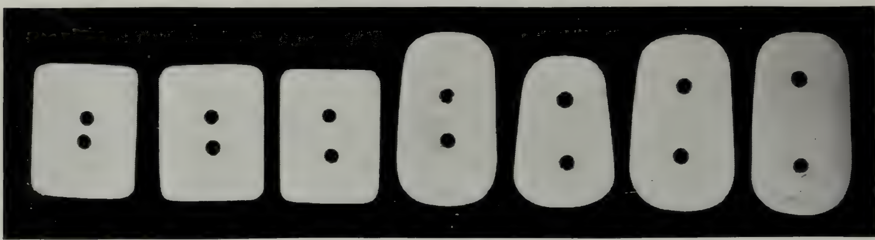
These were devised by the writer primarily for use in general practice, where they have proved of great value, but he had also in view their use for teaching purposes, which will be dealt with later. These non-platinum tube rods are to be had in eleven sizes, and in six special shades. The writer was given to understand that there were practical difficulties associated with the manufacture of these rods in two principal colors shaded as in the case of plain and other forms of teeth and crowns, but these difficulties have been overcome, and in consequence the range of their usefulness is largely increased.

The series consists of four non-platinum single-tube rods (Fig. 3), each with a number stamped on its base denoting the size. The numbers range from 22 to 25 inclusive, No. 22 being the smallest.

In addition to the single-tube rods there are seven double-tube rods, Nos. 26 to 32 inclusive (Fig. 16), in three different sizes, which have the tubes in different positions. In the largest rods, Nos. 29, 31, and 32, they are approximately $3\frac{1}{2}$ mm., $6\frac{1}{2}$ mm., and 8 mm. apart, while in the second size, No. 30, the tubes are about $5\frac{1}{2}$ mm. apart; in the third size, Nos. 26, 27, and 28, or the oblong rod with slightly rounded corners, they are about 1 mm., $1\frac{1}{2}$ mm. and $2\frac{1}{2}$ mm. apart—the measurement in all cases being from the nearest point, not from the center of the tubes.

From what has been already said with regard to the adaptability of the larger forms of tube teeth for conversion into the smaller varieties, and the extensive range of shades in which these are now available, it would seem that in crown work, at any rate, there is small room for the tube rod. This is, however, not the case, when it is considered that these

FIG. 16.

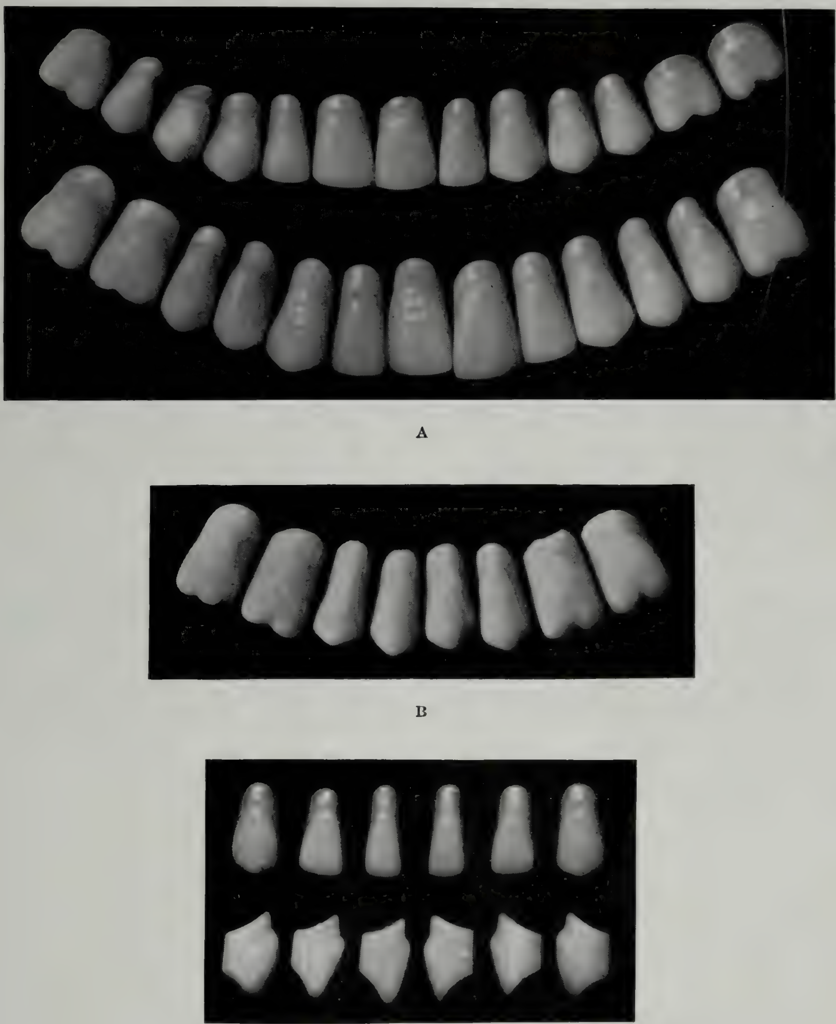


No. 26. No. 27. No. 28. No. 29. No. 30. No. 31. No. 32.

End views of double-tube rods.

rods supply the dentist with the blank forms from which he can shape up any plain tooth or crown to meet all cases except those in which the bite is excessively close, while in addition it will be us independent of the near proximity of a dental depot—a matter of no small importance to men who practice far from a large center. Variations with regard to color may be effected by employing

Fig. 17.



A

B

C

Specimens of tube teeth. (Lemale & Co., London.)

seen that they can be used for forming all porcelain bridges. These alone are great and obvious advantages, as the necessary materials are thereby provided in a simple and portable form, making the shaded rods previously referred to. The six special shades mentioned will, however, be found to meet the requirements of most cases.

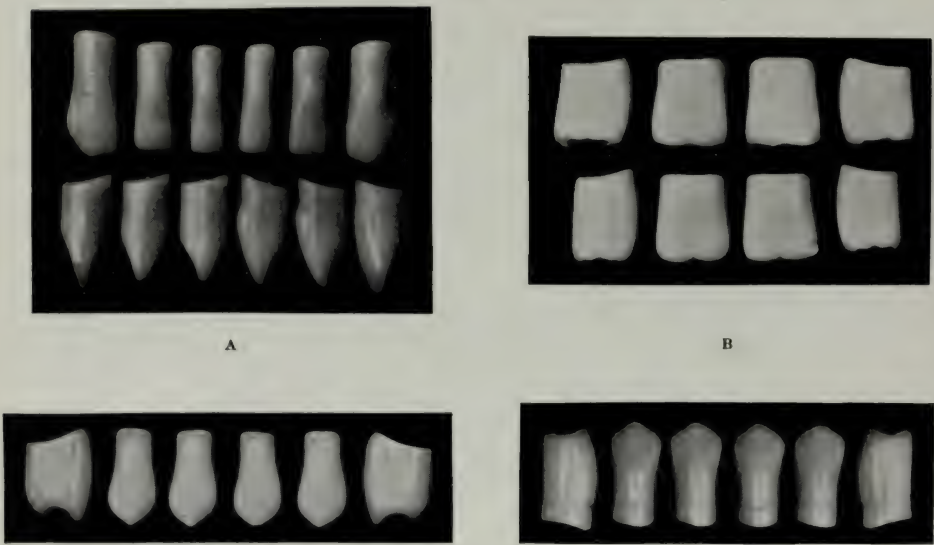
It is further to be remembered that

we have a choice of coloring enamels which enables us to match any shade desired, thus increasing their range of adaptability.

The size of the tube in the platinum tube tooth, also of that in the non-platinum tube tooth and tube rods, is here given in millimeters, as well as in fractions of an inch, also the size of posts suitable for these. Unfortunately, there is no national or international standard gage which gives the correct size of tube or tube posts.*

The writer much prefers a post 1.65 mm. or 65/1000 of an inch both for non-platinum tube teeth and porcelain rods with tubes 69/1000 of an inch, and he finds this allows of ample strength for all purposes, and does not unduly weaken the tooth as the larger size is apt to do, particularly in the case of small lateral incisors. The larger size of tube, too, would prove a disadvantage in many cases where these are employed for bridge work. In fact 13½ U. S. gage is an ideal size for posts, and the tubes of tube teeth and porcelain rods should be made to fit these accurately.

FIG. 18.



A B C D

Specimens of tube teeth. (Ash, Sons & Co., London.)

With regard to the size of rods, little difficulty should be found in selecting that which will require the least amount of grinding. Generally speaking, size No. 25 will be found useful for all molars; size 24 for upper centrals, canines, and upper bicuspids; size 23 for forming upper laterals, small upper centrals, narrow upper canines and lower bicuspids, and size 22 for lower incisors, some lower canines, and most upper laterals.

When excessive approximal contour is required, it will of course be necessary

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* Messrs. C. Ash, Sons & Co., London, have a private gage in which size 3 gives the thickness of wire for posts for platinum tube teeth; size 4 that for non-platinum tube teeth. The equivalents of the sizes of wire and diameter of the tubes are as follows: No. 3 pin wire, 1.45 mm. diam., or 56/1000 in.; No. 4, 1.8 mm., or 73/1000 in. Diameter of tube of platinum tube teeth, 1.75 mm., or 60/1000 in.; of non-platinum tube teeth, 2.0 mm., or 79/1000 in.

to employ a rod sufficiently large to afford the material. In many cases these rods are more easily and quickly shaped up to any form required than are some tube teeth. This results in part from the fact that they are more easily handled than teeth, as will be seen when the subject of fitting crowns comes to be dealt with.

The double-tube rods shown on page 606 were devised primarily for porcelain bridge work, and it will be seen when this subject comes to be dealt with more fully later that they are mostly used horizontally instead of vertically. At present the description will be confined to their use in the latter way.

The number of cases where these double-tube rods will be found useful grow as experience is gained with them. Probably rod No. 30, in which the tubes are 5½ mm. apart measured from their nearest points, will be more often used than the rod No. 31, because it will be found that 5½ mm. corresponds very closely with the distance between the center of any single pair of average teeth, with the exception of the molars or the lower incisors. Rod No. 30 may be successfully used for forming double crowns, when these are about a normal distance apart and of average size; also for forming—In the upper jaw, two centrals, a central and lateral, a lateral and canine, a canine and bicuspid, and two bicuspids. In the lower jaw, a canine and bicuspid, two bicuspids, and a bicuspid and molar, the two last-mentioned when of smallish size.

The large rod size 31, with the tubes 6½ mm. apart measured from their nearest points, may be used in the same class of cases as those above enumerated when the teeth or crowns require to be somewhat larger and in consequence their canals somewhat wider apart.

The large rod size 32, with the tubes 8 mm. apart measured from their nearest points, may be used to form in the upper jaw two centrals, a bicuspid and canine, and two bicuspids when the roots of these are somewhat widely separated, also a bicuspid and molar, or two molars when of medium to small size; and in the lower jaw, two bicuspids when the roots are somewhat widely separated, a bicuspid and molar, and two molars when of medium size.

The large rod size 29, with the tubes 3½ mm. apart measured from their nearest points, may be used for forming a cantilever molar crown with extension arm or arms to fill a space, or a molar with extension of a bicuspid either in the upper or lower jaw.*

There are many other possible applications of these, while in plate work they will be found useful in cases of extra-close bite.

Attention is once more called to the deficiency with regard to basal area of nearly all of the forms of tube teeth, with the exception of those special ones devised by the writer. Doubtless new shapes and sizes would much diminish the amount of grinding and shaping up necessary in many cases, and would tend to popularize the tube tooth with those who object to all but the minimum amount of work. It is to be hoped that makers will be stimulated by these suggestions to offer us some half-dozen, or even a dozen, sets of upper front tube teeth, also a few sets of lower front teeth in the full range of shades and designed on the lines of the short-bite tooth, taking great care to have sufficient basal area of porcelain so that they may be used in crown work. Such a selection would suit a large number of cases with but a small amount of shaping up, or possibly none at all, while most of the narrow-based front tube teeth would be useful for plate and vulcanite work.

CHAPTER III.—Posts and Tubes, and Some Remarks on the Casting Process.

With regard to the metals employed, little need be said here except in connection with the posts, both solid and tube, regarding the application of which details will be given in subsequent chapters. These may be of gold or of dental alloy. When of the former, the alloy—gold

* Illustrations of the various combinations spoken of will be given in the subsequent chapter on "Grinding and Shaping."

coin 20 dwt. and pure platinum 10 grains (Essig), suits admirably; or "dental alloy."

Dental alloy. This is an alloy generally composed of one part of platinum to two parts of silver; the composition, however, varies somewhat in accordance with the ideas of the makers, but the proportion of platinum should not be less than three parts of silver to one of platinum, while more than 33⅓ per cent. would not yield a workable alloy. The former yields an alloy which melts at 2150° Fahr., the latter at a lower temperature, but both may be soldered with any grade of solder up to pure gold, although care is necessary when the latter is employed. As to color it is nearer that of platinum than that of silver.

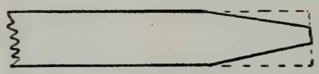
Its working properties are very similar to those of 16-karat gold and its liability to tarnish is about the same. Being somewhat tougher than the platinized gold alloys, though not so rigid, it is perhaps better suited for the purpose, and it may be procured in straight lengths from the dealers in dental supplies.* No. 3, thin, is suitable for platinum tubed teeth. Medium, No. 4, is suitable for non-platinum tube teeth and porcelain rods. Thick, No. 5, is suitable for special cases where extra strength is required, or where, for instance, a canal is much hollowed out, and if the post is carried through the porcelain tube the latter must be enlarged for the purpose or the post reduced in size.

Metal tubes. As tube posts instead of solid ones will be frequently referred to, a short description of how to make them is herewith given. The metal employed may be either dental alloy, platinized gold, or iridio-platinum, and should be of the following thickness for the various sizes of tubes:

	U. S. gage	Width mm.
For No. 3, use plate	29	5½
" " 4, " "	27	6½
" " 5, " "	26	7½

Mark off from the sheet of metal with dividers a strip of the width required,

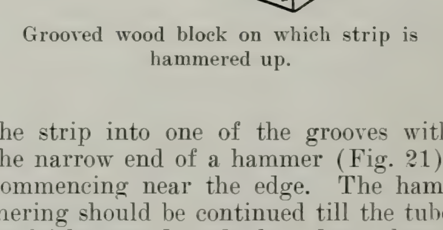
Fig. 19.



Putting point on strip of metal for tubing.

which will be about three times as broad as the diameter of the tube. Make a point at one end by cutting a small piece off each side of the strip (Fig. 19), then anneal. Now with a piece of hard wood or a piece of metal in which there are a number of semicircular grooves, the edges of which in the latter have been rounded off (Fig. 20), tap

Fig. 20.



Grooved wood block on which strip is hammered up.

the strip into one of the grooves with the narrow end of a hammer (Fig. 21), commencing near the edge. The hammering should be continued till the tube is fairly round and the edges almost closed, and the latter are then scraped with a three-square scraper to insure their being perfectly clean, the annealing having put on a fire skin. Another method is to place the strip of gold lengthwise along the groove in the block

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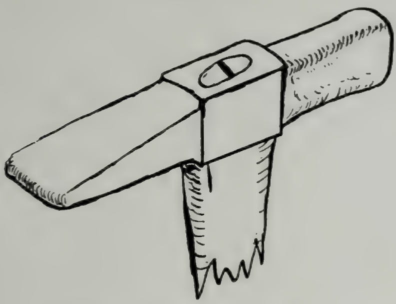
* The following sizes Nos. 3, 4, 5, will be used throughout the text in dealing with the diameter of pins, posts, and tube posts, unless otherwise specially mentioned; but in dealing with the thickness of plate the United States gage will be employed. The necessity for using C. Ash, Sons & Co.'s gage is that there is no exact equivalent size given in United States gage, and to constantly refer to the correct sizes in fractions would be cumbersome.

and with a steel rod slightly smaller than the width of the groove drive the metal strip and mandrel into it, follow-

FIG 21.

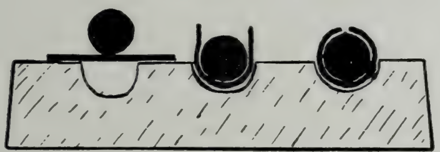


Hammer used for tube-making.

ing this up as already described, until the edges are almost closed (Fig. 22).

The tubing is then taken to the draw-bench and drawn through a plate until the edges are quite closed and the tubing

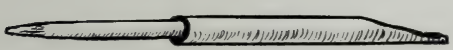
FIG. 22.



Stages of hammering up strip to form tube.

quite round. This is very important, as if the tubing be soldered before it is quite round there will always be a "kink" in the bore at the joint. In order

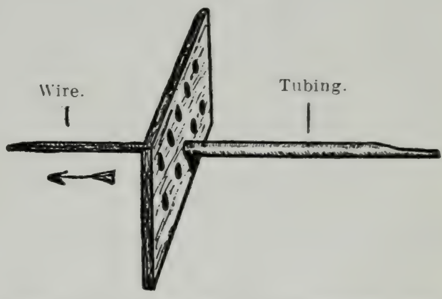
FIG. 23.



Shows how copper wire is introduced into tube. Point of wire sticking out.

that one may be quite certain that the inside of the tube is quite true, a piece of wire may be introduced before passing the tubing through the draw-plate for the first time. This wire should be of copper, not steel, as the latter metal does not yield to compression, and consequently the tubing might be thinned at certain places during the drawing process. The wire, and also the inside of the tube, should first be waxed or oiled to facilitate the withdrawal of the wire. This is done as follows: File a point

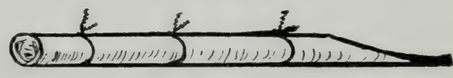
FIG. 24.



Shows how copper wire is withdrawn from tubing by means of draw-plate.

on the wire, and in placing it within the tube leave the point on the wire projecting from the distal end of the tube (Fig. 23). After the tubing has been drawn to the proper size, push the point of the wire through a hole in the draw-plate, which will allow it, but not the tubing, to come through. The wire may now be easily withdrawn (Fig. 24).

FIG. 25.



Method of tying tubing.

Having got the tube round, a thick solution of borax is applied on the outside. Now introduce some of it into the bore of the tube, and with a fine wire work it along the whole length of the joint. This insures the joint being properly soldered; the borax inside drawing the solder through. Tie the tube with binding wire, using small pieces at short distances apart. (Fig. 25.) Before doing this, borax once more on the

outside, as with the handling most of the solution will be rubbed off. Now cut tiny pieces of 20-karat solder and carefully lay them along the joint. It is very important that too much solder should not be used, but, of course, no definite rule can be given for the amount required; this must be left to the judgment of the operator. Dry the borax very carefully with the blowpipe flame so as not to make the solder jump, and then starting at one end heat gradually and flow from one end to the other. If this operation is carried out carefully the joint will be completely closed, the solder having run well between, and on account of the minimum of solder being used no obstruction is made in the bore of the tube. To finish, use file and fine emery-paper.

Exactly the same method should be employed in making tubes of German silver, brass, or copper, with the exception that the joints of these need not necessarily be soldered, though it is best that they should be. These base-metal tubes are useful for temporary crowns and for other purposes. It is also an advantage to have on hand a series of precious metal as well as base metal tubes which will accurately telescope over the three sizes of wire, Nos. 3, 4, and 5. The special purposes for which these will be useful will be seen later.

The Casting Process.

Before proceeding to deal with the subject of the superiority of tube teeth over other forms, it may be well to point out that little will be said with regard to the casting process, and the omission will not be due to lack of appreciation of its advantages or admiration of its author, Dr. Taggart of Chicago, as well as of others who by their untiring efforts have brought it to such perfection. These workers have earned the gratitude of the profession for all time. It is seldom, however, that a new system is brought forward which in every particular proves superior to the one which it is designed to supersede, and the casting process is no exception. It fails to afford sufficient opportunity for acquiring and developing that skill in metal working which distinguishes craftsmen, and the development of which the introduction of vulcanite did so much to check. No one however, would dream of suggesting that the casting process be discarded on account of the over-enthusiasm of some who employ it injudiciously, and who would have us believe that it may with advantage be made to supersede all other methods. Doubtless it could be, but we would still be the losers, for the reason already given. To the present generation of practitioners this would matter little, as their methods of working are more or less fixed; besides, they have the choice of methods. But with the rising generation of students there is danger of too much dependence being placed on the casting process, and as these papers have been written partly with the object of directing attention to the necessity for developing the student's artistic skill as well as his manual dexterity, the advice is tendered to those in authority to exercise care that such a valuable system as the casting process is not allowed to interfere with the methods of training which have hitherto served us well, and that while the process should be thoroughly taught, it should not be given first place, but treated as a valuable adjunct, and the older constructional methods mainly relied upon.

That the writer fully realizes its value will be recognized when the subject comes to be dealt with in a subsequent paper dealing with the use of tube teeth and gum tube sections.

(To be continued.)

Proceedings of Societies.

NORTHEASTERN DENTAL ASSOCIATION.

Nineteenth Annual Convention, held at Hartford, Conn., October 14, 15, and 16, 1913.

THE nineteenth annual convention of the Northeastern Dental Association was called to order in Foot Guard Armory, Hartford, Conn., Tuesday morning at 11 o'clock, October 14, 1913, by the president, Dr. F. T. Murlless, Jr., Hartford, Conn.

The first order of business was the reading of the minutes of the previous annual meeting.

Dr. BOARDMAN moved that the reading of the minutes be dispensed with, inasmuch as the Transactions had been published and distributed to the members. (Motion carried.)

After the transaction of some routine business,

Dr. GAYLORD addressed the association with regard to the National Relief Fund which was being established by the National Dental Association for the assistance of aged and indigent dentists.

Dr. McLEAN moved that the association contribute five hundred dollars to the National Relief Fund. (Motion carried.)

Dr. GAYLORD moved that the association donate out of its treasury $50 to the widow of Prof. John Coolidge of Boston, who, Dr. Murlless explained, was in need of assistance. (Motion carried.)

Dr. Murlless appointed as the Committee on Nominations Dr. A. J. Flanagan, Dr. J. H. Jackson, Dr. W. E. Boardman, Dr. G. O. McLean, and Dr. Henry McManus.

The association then adjourned until 2.30 o'clock.

TUESDAY—*Afternoon Session.*

The meeting was called to order on Tuesday afternoon at 2.30 o'clock by the president, Dr. Murlless.

Dr. N. A. Stanley, New Bedford, Mass., was called to the chair, while the president, Dr. F. T. MURLLESS, read his annual address, as follows:

President's Address.

By Dr. F. T. MURLLESS, Jr.

We stand today at the beginning of the nineteenth year of the history of this association; it is the fiftieth year since the organization of its two predecessors, the Connecticut Valley and the New England Dental Societies.

It is almost seventy-five years since the first dental college was founded in Baltimore. Keenly disappointed though they must have been by the refusal of the faculty of that medical college at Baltimore to establish a chair of dentistry as part of its curriculum, Hayden and Harris could not have failed in later years to see that their most optimistic dreams had been surpassed by the developments which followed the establishment of their dental school. It was indeed a small beginning, but Hayden and Harris were finely prophetic in their belief that dentistry had become a science, and in their recognition of the

possibilities of systematic instruction in it.

That there was much to learn must have been glaringly apparent to these foresighted men, for they were men of culture and of scientific bent, but they could not have known how great a thing they nurtured. It would have been impossible to persuade these men that an art which to them meant but relief from suffering and the repair of the mechanical damage to the human machine incident to the loss of teeth, was to become a science in which that for which they labored, complete as it afterward became, should be overshadowed by a far greater thing—preventive dentistry, which is now rendering less necessary and constructively less important the thing for which they and the men who came after them so devotedly strove. Yet this last could scarcely have grown to its present recognition but for these beginnings and the fostering of the thousands who followed Hayden and Harris.

Practice ever outruns theory. In the enthusiasm of a broadening outlook, facts were many times cemented together with assailable theories, and in the crucible of debate upon the floors of dental societies and in dental journals fond and cherished theories were forever destroyed, and facts snatched from firm associations were painstakingly and repeatedly readjusted to comply with each newly discovered principle.

These conditions and associations have ever given us strong men and forceful ones, and their enthusiasms and genius stand today crystallized as part of the wondrous whole which we call dentistry.

To you here, there is no need of enlarging upon the breadth and scope of dentistry today, or to enlarge upon the minute and technical skill demanded by its thousand processes, the choice and sequence of which are determined by intimate acquaintance with the growth and development of the human body and with the disturbances to which it is subject. Preventive dentistry is more than this—it is superdentistry, demanding the finest of skill and the highest knowledge, applied with a new purpose born of a new hopefulness for the protecting and perfecting of the human animal.

What prophylaxis will do, we know; its efficiency has been proved, and the public is beginning to clearly grasp its possibilities. That there is need of preventive dentistry is shown by appalling school and dispensary statistics, and the demand for dental attention is worldwide and knows no geographical or social lines. Today the economic value of the dental dispensary is recognized, and the true value of the science of oral sanitation as a department of the work for child-welfare is becoming known, and educators and social economists are demanding that dentistry shall assume its just burden as a force in sociological progress.

The profession of dentistry has achieved a personality, and it is making a demand which cannot be ignored. There is before us a compelling situation which we must satisfy. Our educational standards must be materially raised. The responsibilities of a dentist have become such that what might be termed an average education is entirely inadequate as preliminary to a course in dentistry. The lack of definite habits of application and positive mental training will, in these later years, prove an insuperable handicap to students who would be creditably successful if they could be dated back twenty-five years, and compelled to grow up with the profession. There is no professional or vocational work which demands a higher type of man than does dentistry today. Nowhere is there a greater promise of reward and recognition for high personal attainment.

College graduation as a preliminary to graduation in dentistry is reasonably needful, and nothing short of actual high-school graduation should be accepted. A definite attitude toward this matter on the part of the dental societies will give to the dental schools and dental boards a backing which they cannot but welcome, and through the higher educational standards thus established

we shall also secure a large increase in the quantity of student material, for which there is great demand.

Dr. Murlless resumed the chair, and announced as the next order of business the reading of a paper by Dr. CLARENCE J. GRIEVES, Baltimore, Md., entitled "The Responsibilities of the Dentist in Systemic Diseases Arising from Dento-alveolar Abscess, as Illustrated by the Etiology of Peridental Abscess."

[This paper is printed in full at page 564 of the present issue of the COSMOS.]

Discussion.

Dr. J. W. BEACH, Buffalo, N. Y. In the treatment of the subject under discussion, Dr. Grieves most positively confirms his reputation as an exponent of the modern school of dentistry and his advocacy of the broader pathology.

As a profession we are particularly gratified in the awakening of the medical profession to a realization of our importance in the healing art. This change of sentiment was inevitable, although very tardy in its inception.

For many years, the apparent indifference of medical men toward our profession was a delicate topic of discussion at many of our conventions. We formulated schemes whereby we might foist our vaunted worth and importance upon them and coerce them into leaving their entrance door ajar, so that we might squeeze into their sacred ranks.

Ever since I have taken an active interest in these discussions, it has been my argument that, when the medical fraternity recognized that we had something to give them which they wanted, we would be gladly accepted with open arms. This prophecy is rapidly becoming a reality. In fact, even now it has reached the point where a prominent health officer and physician but recently warned a party of dentists of which I was a member that we must look to our laurels, for he saw unmistakable evidence that a certain element of the medical profession was endeavoring to control the great movement of oral hygiene which is sweeping like a tidal wave over the civilized world. Thus it will be seen that the dental profession must accept this new order of things and rise equal to the emergency.

Dr. Mayo asks if we will accept the responsibility. I may say that we accepted the responsibility when we created it. The dental profession is rapidly becoming an institution of educated men who compare most favorably with the rank and file of the allied profession of medicine. In consequence, we are capable of dealing with this situation, which must be done through proper organization and management. Even more significant than the statement of Dr. Mayo were those made by two eminent New York specialists in tuberculosis, before a section of the International Congress on School Hygiene, held in Buffalo recently, in which they said that it was practically impossible to control this disease without the mouth and teeth having been placed in a healthy state. The truth of this statement is unquestioned, and puts the proposition squarely up to the dentists. Will we accept the responsibility? Most assuredly we will, and with an army-front of thousands of conscientious and enthusiastic practitioners, we will go forth to the battle to conquer the enemy, for humanity's sake.

This new phase of our calling, it seems to me, settles the question of the broader pathology. We cannot ignore the close connection between local and general dental pathology. Now that we are definitely launched into this broader field of usefulness, we must have the collaboration and assistance of the general pathologist in establishing the connection between the pathology of the mouth and that of the general system, in the many oral conditions with which we have to deal.

I am in hearty accord with the position of Dr. Grieves relative to the responsibility of the dentist in all pathologic conditions of alveolo-dental abscess. We are all agreed that incipient and pus-forming abscesses send their poisonous influence to the remotest ramifications of the circulatory system; hence the responsibility of the dentist, in this connection, is positively defined.

Today we may be justified in charging with criminal neglect the dentist who wilfully permits these conditions to exist, and the responsibility is qualified only by the general state of the mouth as well as the general physical state of the patient. You will recall the comparatively recent statements of the eminent English pathologist, Dr. Hunter, in which he openly scored American dentists for their unscientific crown and bridge work, which, according to his observation and experience, engendered a train of pathological conditions which even endangered the lives of some of his patients. His statements occasioned much resentment from American dentists, but the ultimate effect has proved of much value to our pathology. We must remember that we often suffer the severest criticism from our best friends.

Dr. Grieves has not magnified the responsibility of the dentist in this particular field, for there are numerous instances of fatalities which have been directly traceable to inferior dentistry. There is also no doubt of the necessity for preserving a healthful state of the periapical tissues. The failure to do this naturally results in the establishment of a *locus minoris resistentiæ,* as has been recently pointed out in connection with the etiology of pyorrhea by Dr. Kirk, to whom Dr. Grieves has referred. This state forms the key to the situation, and frequently is occasioned by a lowered general condition of resistance of the individual. Dr. Grieves has dwelt largely upon the causative effect of dento-alveolar abscesses upon the general system, but has said nothing of the opposite condition, viz, that of the influence of a general condition of atony in producing different forms of dental abscesses. The influence of these opposite conditions may be considered equally important when operating from either direction. When we meet with devitalized pericemental tissue, which is analogous to a condition of necrosis, we agree with Dr. Grieves that the tooth is a constant source of irritation the effect of which may be far-reaching, and its removal unquestionably is indicated. Nature endeavors to rid itself of the unwelcome tenant, and institutes an active process of exfoliation. Combative local treatment should not be attempted. But it is rare that any other condition occurs, unless the resorption of alveolus is very extensive, which is not amenable to corrective treatment. This ofttimes must be radical to produce sufficient reaction in the surrounding tissues.

Dr. Grieves speaks of suprarenal extract as influencing the immediate periapical tissue. The use of adrenalin and cocain for immediate pulp extirpation offers an unquestioned advantage, owing to the hemostatic action of the suprarenal extract, because it does not leave the blood-clot, to which he refers, partially filling the apical foramen. When pressure anesthesia is employed correctly, it is carried only to a point at which the circulation of the pulp is temporarily suspended, without producing continued stasis. In such instances, immediate root-filling has proved to be good practice. But if the slightest hemorrhage supervenes, then treatment should precede the filling operation.

Dr. Grieves asks what constitutes complete pulp removal. Perhaps we might answer that question by saying that it is the complete removal of the pulp. Although that may sound somewhat paradoxical, yet we seldom are positive that the operation of removal is complete. To much of our root-canal work the application of the advice given to the soldier —"Trust in God and keep your powder dry"—may be suitable. Resorption—in other words, the activity of the leucocytes—is often our salvation, and is nature's way of demonstrating her tolerance of the dentist.

The question of the selection of material for root-canal filling is one of great import to us. There has been used almost every imaginable substance, both solid and liquid, which could be introduced into the root-canal. I sometimes think if our patients were aware of the heterologous collection of junk which they carry about in the roots of their teeth, much of our vaunted skill would be dissipated in their minds. There must be one material superior to all others. We know that the requirements

of a root-canal filling include hermetically sealing apical foramina, exerting, where necessary, a mildly germicidal influence, and where periapical infection has not been present a sterile material may be employed. There is no doubt that metallic oxids establish a more satisfactory condition at the apical opening than any material thus far employed. However, the ideal root-canal filling applicable to all conditions is yet to be developed.

Dr. Grieves has spoken of the efficiency of the older methods which, although imperfect, compare favorably with modern procedure. He mentions the clean cotton method which was much in vogue during the pioneer period of operative dentistry. As he remarks, this method was successful until the moisture absorbed by the cotton became a source of infection. I have seen numerous instances where this material, after years of quiescence, has become active, usually producing a low form of subacute irritation, with a history of slight discomfort for months and often years, and when the canal is opened by the dentist a most persistent form of incipient abscess with an extensive area of infection is presented. Exposure to external air, even under the most aseptic precautions, excites activity, and it is a lesion with which both patient and dentist have a long, slow, nerve-racking battle to wage. No material used in root-canal filling has ever, in my experience, caused more strenuous resistance to all efforts at control than has this. However, Dr. Grieves has admitted the apparent fact that the technique, as evidenced by the older practitioners, as well as those of the present time, does not give materially different results, and opens the question as to our present status in connection with this work. This leaves a point of ingress for the empiric, and gives us but little definite knowledge of the proper procedure. All roads lead to Rome, and although each individual dentist appears to be traveling one of his own, they all eventually arrive at the same destination. However, many are like the good pilgrim, who on his journey fell into the Slough of Despond, which may be represented by a blooming, pus-exuding, pericemental abscess.

I will speak of but one more phase of this work, which is the use of the X ray as a diagnostic aid. Our profession is chronically subject to periodic attacks of *innovatitis;* in other words, innovations in our methods are following each other with distressing frequency and regularity. At the annual meeting of the New York State Dental Society, held last May, the X ray in dentistry came in for considerable discussion. A report was presented embodying the opinions of many of our prominent educators and scientists throughout the country, the great majority of whom expressed themselves as favorable to its use in many conditions with which the dentist has to deal. In this opinion we most heartily concur, for the X ray is one of the best means of diagnosis that we have—and yet frequently the most difficult to interpret. A prominent New York dentist opened the discussion in an unusually convincing and characteristic style, stating that he had become addicted to the use of the X ray to the extent of radiographing every tooth the root-canal of which he contemplated filling. This indicated to him the size, contortions, distortions, convolutions, tango dips, etc., which the unfortunate root might have inherited. The enthusiasm with which he seemed imbued and the convincing manner of his presentation of the subject was quite inspiring to his listeners. He described the procedure whereby he placed the patient in the hands of his X-ray specialist, who forthwith radiographed the innocent and unsuspecting tooth, and how, within five minutes thereafter, he proudly placed before the astonished eyes of the patient a picture of his internal and theretofore unsuspected peculiarities which enabled him to perform a more perfect operation of root-canal filling. This procedure he modestly acknowledged took place on an average of five times each day of practice, and thus demonstrated the actual necessity for its use. Of course the "X" preceding the ray should not be vulgarly interpreted as representing the addition to the exchequer of the poorly paid den-

tal practitioner. However, five such occurrences each day would form such material increase to the income of the average dentist that there might perchance develop a new pathological condition—of *X-rayitis.* Now, supposing that, in order to prove the scientific value of the X ray, he should supplement the filling process with the same procedure and display the second negative to the gaze of the credulous patient, and indicate the perfection of the operation which had been so materially aided by the first X ray. We feel sure, provided his enthusiasm and earnestness should prove adequate, that the patient might be convinced of the efficiency of the procedure. Would not teeth abscess just the same? At any rate, it would prove *pro* or *con.* This statement is not made in a slighting manner, and we admire this dentist as a practitioner and a sincere man; but the whole question of root-canal filling resolves itself into one of manipulative skill, and it seems to me a reflection on the ability of the expert operator—who with years of experience has not become so proficient that, with the delicate instruments at his command, he is as capable of determining the presence of unusual conditions which would interfere in performing a perfect operation of root-canal filling without the X ray as with its assistance. It has been a source of great help to me, and is employed whenever doubt manifests itself, and it could prove or disprove the prognosis. But unless we take the second radiograph, the first one proves nothing regarding the quality of the operation. In the majority of instances, it must be left for the All-seeing eye to determine the results of this work.

Dr. Grieves' paper has been instructive and scientific in character, and has given us a thorough exploitation of a subject second to no other in importance with which we have at the present time to deal, and I am sure it will result in material good to our profession.

Dr. A. J. Flanagan, Springfield, Mass. The first point in Dr. Grieves' paper that impresses me is that he has put a very effective stop on some of the alarmist reports concerning infection through the mouth. Someone has said that the optimist is the man who does not care what happens, provided it does not happen to him. It strikes me that the pessimist needs to be watched sometimes as well as the optimist. There is no question that many have gone to extremes with these alarmist reports, which are considerably exaggerated.

Dr. Grieves distinguished between local and systemic infections, and pointed out where they overlap each other. He also stated that, while the mouth is so commonly referred to as a portal of infection, without any further explanation, many infections pass from the system. Of the great amount of infectious material that passes through the mouth, it is but fair to assume that only a small proportion causes infection.

As to gingival irritation caused by crowns and bridges, we might talk for months. There was a great deal of truth in Dr. Hunter's statement about the evil effects of crowns and bridges in the mouth. To prove it we only need to look at the statistics on bridge work. There has been an increase of from seventy to eighty per cent. of dental laboratories which are making bridge work for dentists. With all due respect to the calling of dentistry, the dental laboratory has not only been a help, but one of the greatest curses ever known, when we stop to consider the tremendous amount of irritation and infection caused by laboratory-made bridge work. Dr. Bonwill used to say, "God Almighty did not make teeth to last forever," and he did not believe that dentists could. He also said that any dentist who made one tooth do the work of three or four or five was bigger than God Almighty.

The essayist spoke of the difference between gastric infection and mouth infection—which is of great importance in hospital practice.

For some years I have made the statement that I never saw a dentist who could re-create pericemental tissue. I was delighted to hear Dr. Grieves say that he knows of no treatment by which we can re-create that tissue.

I was also glad to hear him admit that he does not always fill root-canals

to the ends. It is rather pleasing to some of us to have men like Dr. Grieves admit that he has the same troubles as we have.

Dr. H. E. Hosley, Springfield, Mass. This paper by Dr. Grieves has been most illuminating, and will, in the future, prove to be epoch-making.

I had hoped that the purely scientific aspect of the paper might be more fully brought out in the discussion, but possibly the discussers have not had occasion to develop further illuminating facts about this most important subject. Personally, I wish to express to Dr. Grieves my keen appreciation, and I think I echo the feeling of the society when I say that his paper has been extremely profitable, not only from the scientific viewpoint but from the viewpoint of value in everyday practice.

Dr. P. M. Williams, Rutland, Vt. I have been very much benefited by Dr. Grieves' paper. I have never heard or read a better paper on the subject of root-canal treatment. I would like to ask whether, if bacteria are introduced in a root-canal during pulp removal, these bacteria will do any harm if no pulp tissue is left in the canal.

Dr. Grieves (closing the discussion). I wish to thank you for all your courteous appreciation of my effort, and first answer the question which has been asked by the last speaker. I believe, from Dr. Hinman's and my own work that bacteria left in a canal are extremely deleterious if that canal is not sealed in some way—I take it that you mean when the pulp has been removed?

Dr. Williams. I mean sealed at its entrance into the pulp chamber, but not any filling attempted in the root-canal itself.

Dr. Grieves. These cases are quite common, more common than you believe, and all become filled with infiltrate from the tissues, if not with tissue itself. If the canal end is large enough at the opening, the soft tissue will protrude down into the canal in the form of a fungous growth, and the canal is finally filled with exudate and becomes an ideal culture tube, owing to the presence of moisture at one end, and the body temperature. The work of the anaerobes, of which we do not know much, is the alarming feature of this situation. We used to think that it was only the aerobic bacteria that gave trouble, and that we were safe if we kept the air out, but investigations with regard to the anaerobes have shown that they are very dangerous in effect. Rosenow, Davis, Jackson, and Billings have detected these organisms deep in the tonsillar crypts, away below the points where air could reach them. Dr. Hinman has also taken these organisms from root-canals and grown them in agar away from air, and they are very dangerous organisms sometimes. Thus we see the particular danger involved if the dentist attenuates the vital activity of micro-organisms, in other words, reduces their vitality just enough to allow them to pass into the tissues beyond.

To what has already been said, I wish to add that I have been very much provoked at the most reprehensible attitude of certain members of our own and other professions who have allowed their muck-raking and alarmist articles to be exploited in some of our dental journals, and sometimes in popular journals, all giving a black-eye to the dentist.

Since I have been engaged in this work I have been more ready to meet in consultation, particularly with nose-and-throat men. Not a great while ago I was called into consultation with regard to an alveolar abscess occurring on a tooth that I had not filled myself; I wish I had! It took thirty minutes to get the filling out of the canal, which was filled as well as I have ever seen a canal filled. The throat specialist in this case had reached the conclusion that the primary portal of infection was that tooth. I maintained that it was not. The next day the left antrum, on the side opposite that tooth, became filled with infiltrate, and the patient had sinusitis, pus flowing from the sinus membranes. The real value of such investigation lies in the fact that, if we have done as clean work as we know how, and if such work has lasted for years, we can look the specialist in the face and maintain that the teeth are not the pri-

mary portal, and immediately the specialist will change his attitude toward our specialty. I no longer accept the blame for root-canal work that has been in a tooth for years. If we know that our root-canal work is right, it is poor policy to doubt its quality after it has been in the canal for years, and to open the tooth—because the blame will then surely be placed on the dentist.

The meeting then adjourned until the evening session.

TUESDAY—*Evening Session.*

The meeting was called to order on Tuesday evening at 8 o'clock by the president, Dr. Murlless.

After consideration of certain amendments to the by-laws,

The President then announced as the next item on the program the reading of a paper by Dr. H. W. VAN ALLEN, Springfield, Mass., entitled "The Roentgen Ray in Dentistry."

[This paper is printed in full at page 587 of the present issue of the COSMOS.]

Discussion.

Dr. A. J. FLANAGAN, Springfield, Mass. At the present time, when the use of the X ray is so common, it is really surprising that the vast majority of dental practitioners do not use it more generally. A great many complicated cases defy diagnosis by the young practitioner. When I entered practice, which was before the days of the X ray, I used to go to Dr. C. T. Stockwell and Dr. Newton Morgan of Springfield for consultation when I had a difficult case. Nowadays, in malignant conditions it is an easy matter for an intelligent dentist not only to go to the X-ray specialist, but to refer the case to a pathologist, and thus keep in line with the medical men. If a case presents to a dentist which he cannot treat properly, it is his duty to refer the case to a specialist, just as it is common for other specialists to refer cases to dentists for consultation, especially in cases of obscure neuralgia.

I wish to relate here a case of Dr. Van Allen's. Some years ago, an old lady about seventy-five years of age, who had fallen into the hands of a traveling dentist for the treatment of neuralgia, was sent to the Mercy Hospital in Springfield from Chester. She complained of considerable pain in the neighborhood of the lower third molar, and it seems that the traveling dentist had treated her for a while, but had finally given up the case and decided he could not do anything. The patient went to a physician, who decided to send her to the hospital in Springfield. This is one of the great advantages of medicine—that, when a case presents unusual difficulties, it can be sent to a hospital, while we dentists cannot always do that. When this lady arrived at the hospital, it happened to be my service day as dental surgeon, and Dr. Van Allen called me into consultation on the case. On examination I thought the trouble might lie in the mandible. Dr. Van Allen took an X-ray picture, which showed those dark spots Dr. Grieves spoke of today, which, if we are looking for an abscess, may be mistaken for an abscess. Since we were looking for a bony growth and impingement on the inferior dental nerve, we decided that such probably was the cause. After considerable deliberation I opened into the suspected spot, without avail. In the meantime, I spoke to Dr. J. Wesley Shaw of Springfield, a man of considerable experience and judgment, and when I described the case to him, he said, "Get Dr. Van Allen to take a picture of the upper jaw and see if he finds anything." The radiograph of the upper jaw showed a third molar which was decided to be the cause of the trouble. This molar was extracted, and the patient recovered immediately.

A word of warning should be said against a certain kind of X-ray amateur work that is being done by some young practitioners. Circulars advertising a certain X-ray machine are being sent to men with a limited amount of capital, the advertisement stating how simple it is to take X-ray pictures. It seems simple to take X-ray pictures, but to read them and find out what certain lines and shadows represent is quite another thing. I have in the last few years

met with quite a number of false readings, some of which were entirely inexcusable. We cannot afford to send cases to X-ray specialists unless we know that they are properly equipped and proficient in this technique. I speak of this, because we are continually receiving literature from young college graduates telling us what they are going to do. I claim that a dentist who is looking after the benefits of his *clientèle* cannot afford to do without the assistance of the X-ray machine, especially as people are learning more and more the value of this work.

Dr. E. A. BOGUE, New York. I am not an X-ray specialist, although I frequently have occasion to engage the assistance of one. There is no question that the X ray may be of enormous benefit to us all.

Dr. Van Allen has touched upon a very important point, namely, that it is not the machine we want, but the brain behind the machine to help us.

In a case of which I had five films taken this morning, I had the rhinologist show me the different positions where his tube was placed, and where the film was held.

Dr. Van Allen showed us a case upon the screen in which teeth penetrated both antra, and said that one of these teeth could cause disease, while the other could not. I would like to know upon what grounds he bases such a statement. If the pulps are vital in these teeth, neither is going to cause any trouble in the antrum, but if the pulp is dead in either, trouble will almost inevitably result.

Again, he showed the case of a supernumerary tooth and said that there was no power for it to erupt. I hope I may be pardoned for thinking differently. I think that was the case of a child, and I would like to ask the child's age. It did not seem to be a supernumerary tooth, but an unerupted bicuspid.

Dr. VAN ALLEN. I think the child was eleven years of age, and there were two supernumerary germs present instead of one, not supernumerary teeth.

Dr. BOGUE. In one case the essayist said there was no power to erupt. We do not know the age at which the power of a tooth to erupt ceases. I remember one case in which I was called into consultation, the patient telling me that I need not say anything about my observations, but he would like to know what was the matter. This patient was to be operated upon in a few days. Upon examination, I told him that, although he was sixty-five years of age, he was erupting a third molar. The surgeon later requested me to operate, which I did.

In another case of a child of twelve years of age, the left lateral and the right central incisors were so close together that there was no room for the left central incisor. I spread the teeth apart and inserted a plate tooth, whereupon the power of eruption resumed sway, and today the patient's left central incisor is in normal position. Just now I am treating two cases of identically the same condition, as is shown by the X ray. It is quite true that surgeons occasionally make the mistake of sewing up sponges or scissors, and that dentists make such blunders as have been shown on the screen by the essayist, but it is to be hoped that the young practitioners who know so much when they first graduate will take a little time to have Dr. Van Allen demonstrate to them some of the pictures which he has shown us.

Dr. F. T. MURLLESS, Jr., Hartford. The picture of the antrum which Dr. Bogue spoke of interested me, because Dr. Van Allen stated that these teeth penetrated the antrum. If the essayist will excuse me for doubting such an anomaly, I would like to call attention to the fact that frequently there are convolutions in the antrum which conform to the outline of the roots of teeth, but that between the antrum itself and the internal cavity of the root of the tooth there must lie peridental membrane and the various layers of bone; outside of that, or toward the interior of the antrum there must be mucous membrane, submucous tissue, and there can be no entrance into the antrum of the tooth root unless it be placed there by absorption of the osseous structures and the soft tissues on account of some infec-

tious condition. If the burrowing pus, which seeks the shortest way out, points toward the antrum, usually the root is denuded, and it may be that the root has penetrated the antrum and is seemingly projecting.

In making X-ray pictures I have encountered considerable difficulty in placing the film in the desired position, and a little idea presented by Dr. Ketcham of Denver has greatly helped me in this respect. If we imagine the upper maxilla in profile, the film which follows the contour or concavity of the roof of the mouth is in no sense parallel, as it were, to the general line of direction of the roots of the teeth, and any picture taken of the teeth with the film inside of the mouth has to be made with due regard for the position of the tube so as to divide the two angles, if you please. Of course, the film on the inside of the mouth is practically straight, and the tube cannot be at a position perpendicular either to the film on the inside or to the direction of the teeth which are to be radiographed, else there will be a foreshortening of the roots of the teeth, and it will be difficult to read the film. Dr. Ketcham's film-holders have helped me very much in that respect.

Dr. C. P. WEBSTER, Franklin, N. H. Referring to the radiographs of the lower teeth where the head was tilted in such a way as to bring out clearly the teeth desired, those on the opposite side being merged or blended with the upper teeth, I would like to ask if there is any position allowing us to get a radiograph of the upper teeth in that same way? Can we get an equally clear radiograph of the upper teeth by any position? Is it possible, with the mouth opened widely, to send the rays through the mouth and photograph the teeth in the upper jaw without having them confused with those of the opposite side?

Dr. VAN ALLEN (closing the discussion). Answering the last question first: If some object, transparent to the X ray, such as a roller bandage, is placed between the upper and lower incisors to hold them about an inch apart, and the head is tilted toward the plates and away from the tube, beautiful stereoscopic plates can be obtained showing the relation of the teeth, both upper and lower on both sides. To obtain this result, careful technique must be observed, and the observer must have two fairly uniform eyes. The position is a little difficult for short-necked persons, but with patience the object can be attained.

One plate of the antrum that was shown has caused some discussion. The antrum in this case was not diseased, as was proved by our ability to see the peridental membrane over the entire root-end, which did not extend as far up as the antrum.

In regard to the power of teeth to erupt, I wish to correct the impression which I evidently created. I think the power of a tooth to erupt is dependent upon the development of the root. If I see a root fully developed in the jaw, and the tooth not erupted, I do not believe that this tooth will ever erupt; but if the root is not developed, the tooth will probably come to the surface later on, if it is not too deeply embedded, and is growing in the right direction.

I agree with Dr. Flanagan that X-ray work should only be done by men of experience. To say nothing of the danger to the patient, it is not a good financial proposition unless a practitioner has a large number of cases referred to him for this work. The apparatus is continually being improved, so that, if not frequently renewed at much expense, one's equipment soon becomes obsolete. An experienced radiographer many times goes farther than the surgeon or dentist asks him to in his examination.

For example, recall the plate shown of the lady eighty-two years of age. I was looking for bone disease, but the general view taken showed, in a part somewhat remote from the pain, two unerupted canines, the removal of which brought about a complete cure.

Motion was made and carried that the association extend a vote of thanks to Dr. Van Allen for his valuable paper.

Motion was then made and carried to adjourn until Wednesday afternoon, at 2.30 P. M.

(To be continued.)

THE DENTAL COSMOS

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Devoted to the Interests of the Profession.

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PHILADELPHIA, MAY 1914.

EDITORIAL DEPARTMENT.

WELL DONE, CHICAGO!

THE Illinois State Dental Association rounded out its half-century of existence by a "golden jubilee" celebration in Chicago. March 23d–26th, in which five thousand one hundred and thirty dentists were registered as participants in a meeting, the largest ever held anywhere in the history of the profession. The membership registration at the largest international dental congress yet held, that at Berlin in 1908, was two thousand, yet a single state has found it possible to establish a new world's record so far exceeding the most successful of the international congresses in attractiveness that in point of attendance alone nothing at all approaching the Chicago meeting has thus far been achieved.

This new record may well furnish food for thought, and a consideration of some of the compelling forces leading to so successful a result should be helpful in enhancing the interest in and attendance upon future dental meetings in other localities.

There can be no exception to the general rule that every

effect has its adequate antecedent cause, and the Chicago meeting was therefore not an accident, or a phenomenon growing out of unrecognized or fortuitous conditions; on the contrary, it was the result of a well-conceived plan intelligently organized and efficiently executed by men who understood their problems and who worked earnestly, persistently, sympathetically, and harmoniously for the great success which they finally achieved. The forces behind the meeting had been active for the preceding year in so far as concentration upon the actual details of preparation were concerned, but these same forces had their earlier origin in the work that has been persistently carried on for some years to organize the dental profession of Illinois into a homogeneous working body animated by a common purpose, that of "team work" for the general good of the entire professional body of the state. The organization of the dentists of Illinois through the affiliation of the several local societies with the state association under the influence of a common ideal, and the determination to give to the state association a status that would compel the respect and attention not only of its constituent membership but of the general public, has served not only to build up a body strong numerically, but a body with a high moral ideal and a belief in its ability to succeed in all of its professional purposes.

The history of dentistry furnishes numbers of striking instances of weakness in its larger and more important undertakings due to lack of efficient organization and consequent inharmony of effort. Nearly fifty years ago the first efforts were made to secure national legislation creating organized dental service in the army and navy, and before the present results in that direction met with success repeated attempts were made, which signally failed because of lack of harmony and the need of an organization sufficiently comprehensive to express to the National Congress the demand of the whole dental profession for the desired legislation. Personal and sectional interests were permitted to become paramount to the general professional welfare, and the Congress naturally declined to legislate for the dental profession until it could determine, broadly speaking, what the dental profession really wanted. And so it must be that every large activity or professional purpose is foredoomed to failure unless supported by harmony of sentiment and unity of action.

The dental profession of Illinois has come to recognize these facts, and having learned that harmony of purpose and of effort are the motive power of success, they have been able to bring to a successful issue the greatest dental meeting ever held on this planet.

It may be urged that mere bulk is not the gauge of success in a dental meeting, but while that feature of the Chicago meeting was perhaps the most impressive in a general and superficial sense, the meeting was a success not only in point of size, but in the matter of its splendid organization with respect to every detail, its scientific program, its masterly arrangement of clinics and exhibits whereby it was made possible for all in attendance to see all that was to be seen and to hear all that was to be heard—and, above all, the splendid spirit of hospitality manifested by all of the locally resident membership of the association gave a feeling of comfort and satisfaction to the large visiting body that was deeply and cordially appreciated.

Chicago may take just pride in her achievement. It is something to be proud of to have beaten the world's record in almost anything, and to have gathered together the largest dental meeting in the world's history is a great achievement in itself; but the greater thing is to have developed the civic and professional spirit, the harmony of motive and action and the resultant organization that collectively made the meeting possible. It is that which constitutes a success that the world of dentistry may well emulate with profit to itself and benefit to humanity. We congratulate Chicago for the largeness of its demonstration of how to do big things in the right way.

BIBLIOGRAPHICAL.

THE ELEMENTS OF BACTERIOLOGICAL TECHNIQUE. By J. W. H. EYRE, M.D., Director Bacteriological Dep't. Guy's Hospital, London. Second Edition, rewritten and enlarged. Octavo, 518 pages, with 219 illustrations. Philadelphia and London: W. B. Saunders Co., 1913. Cloth, $3.00 net.

The first edition of this work, published in 1912, played its part as an excellent laboratory guide, and when this, the second, edition appeared it was expected that the work would cover thoroughly the field of bacteriologic technique. On examining the text carefully, however, not a little important material is found to have been omitted.

The most pertinent criticism the reviewer makes of the work is that it has been, as the copyright states, revised, reset, reprinted and re-copyrighted, when it should have been rewritten. This is a criticism which if borne in mind by various authors and publishers would bring about not a little improvement in many of our text-books.

This book certainly has its place in the laboratory as a reference work to be used in conjunction with other works, but as a student laboratory guide for medical, dental, and technical students, as the title states, it does not appeal to the reviewer.

There are some errors to which attention should be called; one of importance is the statement on page 28 regarding ether flame sterilization. Ether and alcohol flaming are employed by many dentists and physicians as a means of quickly sterilizing an instrument; this procedure is rapid but not by any means efficient and should not be employed. Advocacy of such methods tends to impart to the operator a false feeling of security which is dangerous. Also (on page 32) the statement that water at the temperature of 56° C. maintained for thirty minutes is sufficient to destroy the vegetative forms of bacteria, but has practically no effect on spores, requires modification. While it is true that some species may be destroyed at 56° C., others are not. In fact, some species grow luxuriantly when incubated at a temperature of 56° C., and even above it. On page 81, the holding of cover-glasses in the fingers while fixing is advocated. While this may be safely done by a trained laboratory worker, it is not by any means a technique to be permitted in a student laboratory.

The chapter on Sterilization is, on the whole, unsatisfactory. The reasons for using the various kinds of sterilization are not discussed to the extent they should be in a work intended for the use of students.

The author has adhered to one of the older morphologic classifications of Bacteria. This whole chapter is entirely too brief, dealing as it does with morphology, growth, and metabolism.

Although some important media are not included, the chapter on Culture Media is excellent, as is that on Methods of Cultivation.

The chapter on Identification and

Study of Organisms is excellent. The errors are those of omission, and are comparatively few. Too little space has been devoted to complement fixation reactions, not only as a means of differentiation of species, but of diagnosing bacterial infections.

The articles on Special Examinations are, on the whole, excellent. Here, again, much has been omitted that should be included in a work on bacteriologic technique.

Under the heading of Testing of Disinfectants the "hygienic laboratory" method (Anderson's method) is not included; this method is probably employed by the majority of workers in America, surely by those who recognize the fact that it admits of but one interpretation—a fact of extreme importance in arriving at an accurate conclusion as to the relative value of disinfectants.

G.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Zahnaerztliche Rundschau*, Berlin, October 12 and 19, 1913.]

REMARKS ON THE QUALITY AND RELIABILITY OF ORTHODONTIA BANDS. By Zahnarzt Carl Herber, Bonn.

Referring to the article on this subject by Zahnarzt Zielinsky of Berlin, published in the *Zahnaerztliche Rundschau* of September 7, 1913, Herber offers the results of his experiments in regard to the strength and reliability of orthodontia bands of various metals, which may be summarized as follows:

The most suitable material for orthodontia bands is German silver, composed of copper 58.4, zinc 23.3, and nickel 18.4, of which alloy Angle's molar bands are made, according to the writer's analysis. Other analyses show the Angle band alloy to consist of copper 60.8, zinc 18.4, and nickel 20.6, with slight traces of iron, which are to be regarded as impurity. The material used for any part of a regulating appliance must be uniform, in order to avoid potential differences as much as possible. The soldering process requires great care in order to prevent overheating and burning of the thin band metal. The metal should have a high polish before it is worked, and especially before it is gold-plated, as the durability of a band largely depends thereupon. The threads must be cut exact and sharp, and the respective nuts should be ground to fit. The seamless tubing used should be manufactured after the Erhardt method, and consist of the same metal alloy as the rest of the appliance. The thickness of the bands is determined by the strain and stress which they will have to withstand during the course of regulation. Their width should be 5 mm. and they should not be trimmed.

[*Journal of the Allied Dental Societies*, New York, March 1914.]

A NEW CLASSIFICATION OF HUMAN TOOTH FORMS, WITH SPECIAL REFERENCE TO A NEW SYSTEM OF ARTIFICIAL TEETH. By Dr. J. Leon Williams.

The present study marks a further step in the writer's interesting researches regarding the esthetic and anatomical basis of dental prosthesis. (See "The Esthetic and Anatomical Basis of Dental Prosthesis," by J. Leon Williams, Dental Cosmos, January 1911, p. 1.) The facts and principles in-

volved in his proposed system of artificial teeth are briefly summarized as follows: This system is based on the new classification of the natural teeth discovered by Williams, the essential feature of which is the three primary or primitive forms of the upper central incisors common to all races of men and the anthropoid apes. By the crossing and combining of these primary forms, every conceivable form of human tooth can be produced. By applying a knowledge of design to the three primary forms of natural teeth, a system of teeth has been produced in which all the lines and contours of any given set are in more perfect harmony and balance than we find in nature. As the three primary forms of human teeth are common in all races, therefore a system of artificial teeth founded on these primary forms is equally suitable for all races of men, civilized or savage. As investigation shows that there are but a few characteristic forms of human faces, which can all be grouped in a series of a dozen or less, to which groups all slight variations in form may be referred, therefore a few forms or types of teeth, very carefully designed and modeled to harmonize with the more characteristic forms of faces. are immeasurably better suited to the production of natural and artistic effects in dental prosthesis than any number of molds produced indiscriminately and without any knowledge of the above-mentioned fundamental facts. A close study of the relationship of the contour lines of the teeth and face has enabled the writer to design artificial teeth which he claims will often be found to give a more perfect harmony with many faces than did the natural teeth of that subject, the reason for this being that the laws of heredity as exhibited in mixed races rarely permit a perfect harmony in the different features of the body. In the writer's opinion, the arrangement of this system of teeth into classes and groups based on nature, and corresponding with the forms of faces for which they are designed, both being shown in illustrations placed side by side, enables the dentist, aided by the very clear and simple table of classification, to select teeth best suited for any case with an ease, economy of time, and certainty of results never before approached.

Dr. Williams' paper is elaborately illustrated.

[*Le Laboratoire et Le Progrès Dentaire*, Paris, October 12, 1913.]

AMPUTATION OF ROOTS IN THE TREATMENT OF BICUSPIDS AND MOLARS. BY C. BLANC.

Le Laboratoire reprints from *Bulletin de l'Association Amicale des Anciens Etudiants de l'Institut Dentaire de Nancy* the description of a clever method for preserving partly or wholly the important functions of bicuspids and molars the roots of which have been separated accidentally or by advanced caries. In one case an upper left first bicuspid which contained a large filling and had been fractured in the line of the mesio-distal groove, was partly saved by extracting the very loose palatal root and smoothing and polishing the filling in the remaining portion of the tooth supported by the labial root alone. This partial tooth has been doing good service for a long time. In another case, a lower right first molar was so badly affected with caries that the roots had almost become separated, the distal root being loose and having given rise to an extensive and painful pericementitis. Under local anesthesia, the roots were entirely severed, the distal root was extracted, and the remaining tooth portion preserved by filling the anterior root-canal and partly building up the crown by a filling. The writer concludes from his experiences that some roots which have heretofore been ruthlessly extracted can be saved and made to serve as valuable abutments. Molars, for instance, the roots of which have been separated accidentally or by caries, can be restored to usefulness by preparing each root for a band, and joining the bands by a miniature dummy bridge, which will restore the masticatory function of the molar, fulfil all requirements of hygiene, and may be employed as a reliable bridge abutment.

[*New York Medical Journal*, New York, January 24, 1914.]

GAS-OXYGEN ANESTHESIA. INDICATIONS FOR ITS USE. BY A. H. MILLER, M. D., PROVIDENCE.

There are a number of surgeons who hold that nitrous oxid and oxygen is the ideal anesthetic. and that it should be used for all surgical work. There is a larger group who maintain that this anesthetic has no place in the surgical field. In favor of the

latter view are the facts that a number of deaths have resulted from the use of nitrous oxid and oxygen, and that this anesthetic does not produce sufficient relaxation in the average case for the work of many surgeons. On the other hand, it may be said that many lives have been saved through its use which would have been forfeited under any other anesthetic. No observer who has had an extensive experience with nitrous oxid and oxygen can have failed to observe such cases.

The deaths under nitrous oxid and oxygen anesthesia which have been reported are set down in the following table:

OBSERVER.	DEATH ASCRIBED TO—	
Teter	Shock and primary cardiac failure	1
Crile	Myocarditis, six hours after operation	2
Lydston	Anesthetic	3
Allen	Uremia	4
Allen	No details	25
Allen	No details	25
Gatch	Hyperthyroidism	5
Gatch	Pericardial effusion	5
Gatch	Lymphatic diathesis	5
Olow	Diseased heart and arteries	6
Boys	Anesthetic	7
Miller	Suffocation (vomitus inspired)	8
Flagg	Anesthetic	9
Teter	Impure gas	10
Teter	Impure gas	10
Salzer	Anesthetic	11
Collins	Impure gas	12
Buchanan	Anesthetic	13

The case reported by Olow in *Beitraege zur klinische Chirurgie* for December 1911 seems to have been reported as a separate case in *Surgery, Gynecology, and Obstetrics* for April 1912. Among the other cases to which Olow refers in the latter article as fatalities from nitrous oxid and oxygen anesthesia, that of Adams is included in Hewitt's list of seventeen deaths under nitrous oxid, not under gas-oxygen, and that of Owen was a death under nitrous oxid administered for a dental operation and not under nitrous oxid and oxygen anesthesia.

In a number of the foregoing cases, death occurred as a result of lack of care in the selection of the anesthetic. The nitrous oxid and oxygen was employed in spite of manifest contra-indications to its use. It is worth while to consider carefully the indications and contra-indications in the use of nitrous oxid and oxygen.

The indications for the use of nitrous oxid and oxygen anesthesia are as follows:

(1) Depending on the condition of the patient: Anemia; diabetes; acute infections; impaired kidneys, as nephritis; pyelitis; respiratory affections, especially in the aged, as tuberculosis, pneumonia, bronchitis, laryngitis; bad surgical risks, as in typhoid perforation; grave general peritonitis; intestinal obstruction; shock, collapse; debility, the very ill; old age; lowered vitality from any cause.

(2) Depending on the nature of the operation: Many minor operations, manipulations, examinations, and dressings; operations on extremities; obstetric operations; breast operations; operations for empyema; when the effect of surgical shock is feared.

(3) To avoid post-anesthetic nausea and vomiting.

The contra-indications to the use of nitrous oxid and oxygen anesthesia are as follows:

(1) Absence of expert anesthetist and perfected apparatus.

(2) Depending on the condition of the patient: Bad heart lesions with broken compensation, myocarditis, fatty heart, dilated heart; aneurysm; respiratory obstruction; enlarged tonsils and other marked narrowing of upper air-passages; tumors of neck, including thyroid growths; cellulitis of submaxillary and cervical region; emphysema; arterio-sclerosis; increased intracranial pressure from tumor or abscess; intestinal obstruction with distended abdomen; children under five years of age; strong, vigorous, rough men; extreme nervous temperament; addiction to drug habits, or use of tobacco or alcohol.

(3) Depending on the nature of the operation: When perfect relaxation is desired for operations on healthy subjects; operations on larynx and trachea.

From the foregoing, the writer concludes that it is evident that nitrous oxid and oxygen is not the ideal anesthetic for use in all cases. It is also certain that it is an agent of the greatest value in certain selected cases. To determine the proper indications for its use, it is necessary to consider the condition of the patient and the nature

of the operation. In no case should it be used in the absence of a skilled administrator.

Each one of Dr. Miller's statements is culled from and substantiated by one or several special articles on this subject which have appeared within recent years. His compilation, therefore, carries weight.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, April 12, July 5, Sept. 13, 1913.]

BROMURAL IN DENTISTRY. BY DR. G. ULKAN, BERLIN.

BROMURAL IN DENTISTRY. BY ZAHNARZT P. HOFFMAN, BERLIN.

SOME REMARKS ON BROMURAL. BY ZAHNARZT A. MARGONINSKY, BERLIN.

[*Dental Digest*, New York, November 1913.]

THE USE OF NERVE SEDATIVES IN NITROUS OXID AND OXYGEN ANALGESIA. BY DR. E. MUNDÉ.

The agreeable sedative and hypnotic effects of bromural, which have been discused by Dr. A. J. Hecker in a paper entitled "Mild Sedatives in Dental Practice," DENTAL COSMOS, July 1909, p. 844, and in a review in May 1910, p. 602, are being made use of by Dr. Ulkan in the children's dental clinic at Berlin-Wilmersdorf, of which he is chief. He finds bromural a potent and harmless sedative for nervous and frightened children who otherwise resist all efforts at dental treatment. Owing to the selective action of bromural upon the cerebrum, no untoward after-effects arise. After a dose of five grains, or one tablet, even nervous children willingly submit to treatment, the drug exerting its quieting influence about twenty minutes after taking. Cavity preparations, fillings, and novocain-suprarenin injections for subsequent extractions can be made without resistance on the patient's part; even in larger operations, such as bone-chiseling, surgical operations on the soft tissues of the mouth, or root resections, all of which are performed by him under local anesthesia, preparation can be successfully made.

The sedative action of bromural preceding local anesthesia, as pointed out in a paper on "Local Anesthesia in Dentistry," by Dr. R. H. Riethmüller, published in the DENTAL COSMOS, February 1913, p. 179, is made use of in general ethyl-bromid anesthesia by Dr. Hoffman, who found that the amount of vapor necessary to produce anesthesia was less, and the period of induction was shortened. He noted that the anxiety of apprehensive patients preceding such operations as resection of the mandible under local conductive anesthesia by novocain-suprarenin disappeared completely. Hoffman employs bromural also in excavation of hypersensitive dentin, root resection, and cyst operations, and for prevention of after-pain. In one hundred cases he noted negative results twice, first in a very nervous man who was preparing for a very important examination, and again in a hopeless paralytic.

Margoninsky also reports favorably on the sedative action of bromural in nervous or excited patients preceding local or general anesthesia. Even in cardiac cases, preceding local injection, and in children preceding extractions, one tablet of five grains was found efficient and safe.

Mundé employs bromural to good advantage in preparation for the now so popular nitrous oxid and oxygen analgesia. He finds that the patient's confidence is more easily gained after he takes this sedative, his breathing is more regular, which is of great importance for successful analgesia or anesthesia, excitement is done away with, and the amount of nitrous oxid required is reduced to a minimum, which is a decided advantage for physiological reasons. No symptoms of bromism have been observed, even patients with cardiac affections tolerating bromural perfectly well.

[*La Stomatologia*, Milan, June 28, 1913.]

ON THE ANATOMY OF THE ROOT-CANALS OF THE HUMAN TEETH. BY DR. G. FASOLI and DR. A. ARLOTTA.

The anatomic shape of root-canals, a perfect knowledge of which is so important for sucessful root-canal work (see "Filling of Root-canals," by R. H. Riethmüller, COSMOS, April 1914, p. 491), has been studied by various methods, such as metal and celluloid casts, the radiograph, the miscroscope, the shortcomings of which are pointed out by the writers of this paper. They have, therefore, employed the Spalteholz method of studying the internal structure of organs by rendering them transparent. (See "The Spalteholz Method of Preparing Transparent Animal Bodies." By Dr. H. Prinz, DENTAL COSMOS, April 1913, p. 374.) After opening into the

pulp chamber of the tooth to be studied, the pulp tisue is removed with broaches without approaching the apex closely, so as not to disturb its shape. The tooth is then immersed for several minutes in a boiling solution of 5 per cent. caustic potash, in order to insure complete destruction of the pulp fibers, care being taken to raise and lower the temperature of the tooth gradually. A hypodermic needle is then fixed upon the orifice of the coronal cavity by means of plaster, and, with a syringe attached to this hypodermic needle, finely powdered vermilion suspended in a gelatin solution is injected into the root-canals under pressure, the tooth being kept at a temperature of 37° during these manipulations. After cooling, the tooth is fixed in formol, decalcified, neutralized, bleached with hydrogen dioxid, dehydrated in strong alcohol and then treated by the Spalteholz method. Through the transparent, formerly hard tissue the form and distribution of the root-canals can be studied by transillumination and a low-power microscope. The findings which these investigations have yielded and which are beautifully shown in the illustrations which accompany the article, are greatly at variance with the extremely inaccurate and diagrammatic descriptions of the shape and distribution of the root-canals as given in text-books on dental anatomy, and may be summed up as follows: The course, shape, and number of root-canals are extremely variable and irregular, especially in bicuspids and in the mesial root in lower molars. There are smaller or larger anastomoses at different levels between the canals of one and the same root. In some cases the root-canal is single, in others it is divided; in still others it consists of numerous canaliculi which end in as many foramina.

[*Zahnaerztliche Orthopaedie und Prothese*, Munich, Nos. 6, 7, 1913.]

THE QUESTION OF EXTRACTION IN ORTHODONTIA, AND THE TREATMENT OF DENTAL ARCHES DERANGED BY ILL-ADVISED EXTRACTIONS. BY PROFESSOR W. PFAFF, LEIPZIG.

In an introductory review, Pfaff summarizes the views of Case, Angle, Baker, and others, none of which he considers as finally authoritative, because they are based upon the ideals of classic beauty, while our modern patients represent a mixture of races strongly influenced in their organic make-up by environment, nutrition, habits, etc. Children's diseases frequently produce changes in the shape of the skull, and deformities and irregularities in the jaws and teeth. In most cases, he contends, it is possible to bring about normal articulation. The important point in orthodontia, however, is not the establishment of a *régime* of treatment which would suit every case, but the greatest possible usefulness to the patient. Generally extractions for the purpose of regulating are to be avoided; in exceptional cases, however, as Case has shown (see "The Question of Extraction in Orthodontia," by C. S. Case, DENTAL COSMOS, February and March, 1912), the patient's interest may be served better by judicious extraction. The extraction of molars, however, is to be severely condemned.

The greatest usefulness for the patient must also be the guiding principle in the treatment of dental arches which have been deranged by injudicious extraction. The remaining teeth should be put in the best possible articulation, which is not an easy task if the complement of teeth is deficient. Factors to be considered in the treatment are the patient's age, health, and facial appearance, also the condition of the remaining teeth. In young patients, it is frequently possible unless too many teeth are missing, to establish satisfactory articulation; in older patients, prosthetic appliances must be resorted to.

[*Journal of the American Medical Association*, Chicago, January 17, 1914.]

PRESENT-DAY DANGER OF ROENTGEN-RAY BURNS, AND HOW TO PREVENT THEM. BY G. E. PFAHLER, M.D., PHILADELPHIA.

Although roentgenology has made such great advances that serious Roentgen burns are no longer to be feared by operator or patient, Pfahler sounds a timely warning against the combination of enthusiasm for the use of the Roentgen rays and the false sense of safety which will lead to disastrous results in the hands of the untrained and unguarded. Already there have come to the writer's attention a number of serious Roentgen-ray burns produced recently by unskilled men, during single examinations. The enthusiasm with which dentists have recently been rush-

ing into roentgenography, with no more reliable and thorough guidance than a manufacturer's directions or a few magazine articles, justifies the fear that, if this continues, much harm will be done to patients and operators alike, and, secondarily, the specialty of roentgenology will be injured and its progress halted.

In the avoidance of burns one must first keep in mind—

(1) To use as small a quantity of rays as is consistent with the examination.

(2) To use a quality of rays that will penetrate the tissues, and not be entirely absorbed by the soft tissues. One can learn to judge the penetration by frequent use of the penetrometer and by the making of many roentgenograms.

(3) To make every examination as short as is possible, thereby lessening the total amount of rays to be absorbed.

(4) To use intensifying screens when practicable.

(5) To use filters for the elimination of the softer rays.

(6) To confine the rays to the part actually under examination.

Burns of the operator may be avoided (1) by keeping entirely out of the field of rays, by working from an adjoining room with lead-lined walls between, or by the use of lead-lined cabinets; (2) by confining the rays about the tube, so that the only way of exit is through the aperture made for the examination of the patient; (3) by means of protecting shields, aprons, gloves, masks, etc. In fact, all these should be combined.

Burns during Roentgen therapy may be avoided (1) by following the same general principles referred to in diagnosis; (2) by measuring each dose given and never exceeding the limit of skin toleration as indicated by the dose-meter; (3) by allowing an interval of three weeks between the repetitions of the dose on any particular area of skin; (4) by the use of more filtration than would be used in diagnostic work; (5) by keeping in mind the fact that epithelium and glandular tissues are more sensitive than other tissue to the rays; (6) by avoiding any other form of irritation on the skin treated, such as counter-irritation, high-frequency currents, liniments, stimulating ointments, antiseptics, etc.

The details necessary in carrying out the foregoing principles will vary with the individual operator and his circumstances, but they should receive the most careful attention. Roentgenology, in the writer's opinion, is more distinctly a specialty than any other, because to master it one must be a good physician, must have a good general knowledge of pathology both in general medicine and the specialties, must have a large equipment, must give much time to the mastery of details, and must always be cautious.

[*Deutsche Zahnaerztliche Wochenschrift*, Leipzig, December 13, 1913.]

THE INDICATION FOR OPERATIVE INTERVENTIONS DURING PREGNANCY AND MENSTRUATION. BY PROFESSOR DR. WALTHER HANNES.

Speaking from the standpoint of the gynecologist, Hannes maintains that dental treatment during pregnancy or menstruation is contra-indicated only if the tissues are hypersensitive. Treatment should not be deferred if such delay would be to the patient's detriment. On the other hand, in very sensitive patients a relatively insignificant psychic shock may suffice to produce an abortion. This danger is avoided if general, or preferably local, anesthesia is employed, which is not dangerous in regard to miscarriage, as has been fully proved. The occurrence of vomiting does not signify any danger for the continuance of pregnancy, nor does the anesthetic have any untoward effect upon the fetus. There is no relationship between the teeth and the uterus, hence a dental operation cannot have any untoward influence upon pregnancy, provided all psychic shock is avoided.

The hyperacidity of the saliva and the frequent vomiting in pregnancy make it absolutely imperative to repair immediately any dental defects caused by these phenomena. Great caution, however, is indicated in women who have had one or several miscarriages before. In these, it is to be noted, the miscarriages usually occurred at a period when menstruation would otherwise have set in. During the first months of pregnancy, therefore, it is advisable to ascertain the date and duration of the last menstrual period and the usual interval between two periods, and to refrain from dental operations at the

time when menstruation would have otherwise occurred. Liberal hemorrhage from the gingivæ is of no serious significance, unless hemophilia exists.

The same precautions are to be observed during menstruation, where gingival hemorrhage is also no disquieting element, except in case of amenorrhea.

PERISCOPE.

Advantage in the Use of Two Spatulas in Setting Up Artificial Dentures.—If two spatulas are employed in setting up an artificial denture, a great deal of time is saved. One spatula should be heated while the other is being used.—F. G. SCHWARTZ, *Dental Summary.*

Oil of Cloves as a Carbonizer for Dies.—A little absorbent cotton is wrapped on a match or toothpick, dipped in oil of cloves, and ignited, and with it the die is carbonized in the usual manner. The trouble of dies and counter-dies adhering will be reduced to a minimum by these means.—M. J. RUZICKA, *Dental Review.*

Liquid Court-plaster.—A good liquid preparation for cuts and bruises that forms a covering like liquid court-plaster is made by mixing three-quarter ounce of flexible collodion with one-quarter ounce of ether. When this solution is applied to cuts it will not wash off. As the ether evaporates, more of it is added to keep the mixture liquid.—*Popular Mechanics.*

Inlay Abutments.—Before deciding upon the use of an inlay as abutment for a fixed bridge, it is important to ascertain whether there is any tendency to or an already established caries at the labial or buccal cervical margin. The former condition would indicate a strong projection of the labial wall occlusally; the latter generally contraindicates the use of an inlay.—M. J. HOMAN, *Dental Review.*

Anchorage for Fillings Intended as Abutments for Bridge Work.—With pliers a hollow cone of platinum is formed so as to approximately fit the enlarged root-canal. This is placed in the canal, and the wax model is formed over and about it. Then the heated sprue wire is inserted in the cone, making it possible to withdraw the wax model and the post with absolute assurance that they are in proper relation. After casting, we have an inlay with a hollow platinum post reinforced by cast gold.—W. A. HOOVER, *Dental Review.*

Dressings Over Exposed Pulps.—When applying dressings over an exposed pulp, a good protective cap of the right shape and size may always be quickly obtained from thin matrix steel. With scissors, a disk of the required shape is cut, and, with the handle of an instrument, rubbed into a piece of soft wood. This forms a convex cap just suitable for the case in hand, and the dressing, placed either alone as a paste or on a wisp of cotton, can be completely protected from any external pressure. The disk can be so quickly made that there is no waste of time.—B. W. NEAVE, *Commonwealth Dental Review.*

Acute Alveolar Abscess of Upper Lateral Incisors.—A lateral incisor root which cannot be opened through to the apex and goes through a severe acute alveolar abscess formation is rarely of any value afterward. The root itself becomes so saturated with infection and the products of infection that it usually dies, and is at best no better than a replanted root. The end becomes absorbed and the seat of a chronic inflammation. Besides this the inflammation has been so extensive that much bone dies and much pus is formed, and if the palate is reached there is little if any chance of successful treatment, even if the canal of the root is opened. If the root is extracted the pain and danger to health and life are reduced, if not immediately averted. A chronic alveolar abscess often remains after an acute infection of a lateral which does not clear up until the apex is amputated, or perhaps the root lost and a large cavity curetted.—EDITORIAL, *Dominion Dental Journal.*

Removing Oil from Marble.—It is sometimes desirable to remove grease and oil from marble floors, or electric switch-boards. An easy and effective way is to apply strong lye and quicklime. Any strength solution can be made as needed, and no matter how strong it may be it will not injure the marble.

The best method of application is to simply throw on the lye, powder with the quicklime, and use some water with a scrub-brush. The solution can be kept ready for use, and marble slabs can be cleaned daily.—*Popular Mechanics.*

Avoiding the Sticking of Cement or Gutta-percha to Instruments.—To avoid the adhesion to instruments of such materials as cement and gutta-percha, in an ordinary vaselin pot with a well-fitting metal screw top, a hole is cut in the lid of about the size of a florin. The jar is filled with cotton soaked in oil, in such a manner that it stands up like a pincushion above the rim of the lid; it is covered with a piece of buckskin firmly fixed by means of a piece of string or thread. An instrument drawn across the cushion will take up enough oil to prevent the adhesion of material without becoming inconveniently oily.—*Zahntechnische Rundschau* per *Dental Record.*

Vaccine Reaction.—In incipient alveolar abscesses due to vaccination prompt systemic treatment is of primary importance. A course of laxative salts will abort the abscess and hasten resolution. This treatment is favorably indicated where the abutments of fixed bridges are involved. "Vaccinia" apparently produces disturbed metabolism which reacts definitely on non-vital teeth. In albuminuria or uric acid diathesis this reaction usually manifests itself in boils, furuncles, etc., and when the diet consists largely of meat, in the more serious form of carbuncles. To establish normal metabolism the treatment should extend over a week—a teaspoonful in a tumblerful of hot water each morning, fasting, followed by a cup of hot tea.—S. Sherry, *Commonwealth Dental Review.*

A Simple Method of Tightly Wrapping Cotton on a Broach for Root-canal Treatments.—A fine, round, steel broach is annealed in a flame, and the end of the broach is then held tightly with a pair of flat-nosed pliers and drawn smartly through these. This will cause the broach to become somewhat flattened. A shred of cotton is held between the thumb and first finger of the left hand, and the flattened end of the broach is laid on it. By revolving the broach and pressing the finger and thumb slightly together, the cotton will become tightly wrapped around it. To remove the cotton from the broach, as in the case of a dressing in a canal, the broach is revolved in the opposite direction and gently withdrawn, when the medicated cotton will remain behind.—A. D. Burne, *Pacific Dental Gazette.*

Root Restoration in Lower Molars.—In a lower molar where the ravages of caries have separated the roots at the bifurcation, after preparing the roots for restoration, a very good method and one to be depended upon is as follows: A hole is drilled in each root at its largest portion with a proper size round bur in the right-angle handpiece. Then staples of pure silver wire of suitable sizes are made and inserted into the apertures drilled. This serves a dual purpose, holding the roots in perfect and fixed apposition and serving as a staple conduit for the wax. After chilling, the wax is removed and the model carved as desired, invested, and cast.

Pure silver fuses perfectly to the silver staple. No fear need be had that any inflammation of the septum between the roots will follow, as this bland, soothing metal ameliorates the conditions.—W. E. Fribley, *Dental Brief.*

Electric Treatment of Trifacial Neuralgia.—E. Albert Weil recommends the trial of strong galvanic currents before resorting to operation in this disorder. The necessary apparatus comprises a battery of twenty-four or, better, thirty-six cells, with a milliampèremeter and rheostat. The whole neuralgic area is covered with an electrode, consisting of twelve to fifteen thicknesses of gauze moistened with saline solution and held in close contact with the head by tight bandages. The other—negative—electrode is applied to the back of the patient, who is kept recumbent during the treatment. The current is increased in from three to five minutes from *nil* to eighty milliampères, the latter current being continued for from thirty to forty minutes. At the end of the séance, the reduction of the current to zero should likewise be gradual. Daily sittings generally suffice, and improvement is usually manifest after the fifth or sixth treatment. In case of failure, ionic medication, the facial electrode —now to be connected with the negative pole—being moistened with a one per cent. solution of sodium salicylate, should be tried before abandoning the procedure.—*Paris Medical* per *N. Y. Med. Journal.*

A Simple Device for Protection Against Infection in Nose and Throat Examinations.—Most devices which are used by the physician to lessen the danger of infection during examinations of the nose or throat are either so uncomfortable or so inconvenient that they are infrequently used. A very simple device which has been used with great satisfaction for several years consists of a pair of Jumbo-sized steel or aluminum spectacles with either plane or one's own correction for the lenses. To the nosepiece is fastened a piece of aluminum sheet, which is bent to a V shape to allow room for the nose, and extends downward to cover the mouth.

It serves to protect the eyes, nose, and mouth from any spray, and its great convenience in putting on or off, together with the ease with which it may be sterilized by boiling, should make it popular with many. —J. F. CROUCH and C. A. CLAPP, *Journ. Amer. Med. Association.*

The Fate of Cocain in the Body.—Some of the prevailing conclusions in regard to the behavior of cocain appear to be in need of amendment in the light of up-to-date information. When it was first reported that subcutaneous administration of this alkaloid was not followed by its reappearance in the urine, this find, taken in connection with some observations of a different type, made it seem plausible to assume that cocain may be destroyed in large measure by contact with animal tissues. As a matter of fact, newer experiments conducted in the Pharmacologic Institute of the University of Berlin bring evidence that cocain may actually be excreted in decidedly large proportions by the kidneys. At first, in any period of frequent administration of the alkaloid, a tendency toward cumulative manifestations may arise, but the proportionate daily output increases with the use of the drug. According to these newest studies of Rifatwachdani, even prolonged contact with living tissues does not appear to induce a destruction of cocain. For the closely related derivative ecgonin, the kidneys have likewise been demonstrated to afford an effective path of excretion.—EDITORIAL, *Journ. of Amer. Med. Association.*

Prescribing of Cocain by New York Dentists Unlawful.—Druggists are not authorized to fill prescriptions calling for cocain when signed by dentists or veterinarians, according to a decision rendered recently by Attorney-general Carmody, at the request of the State Board of Pharmacy. The ruling is under the Walker cocain law, which was passed at the regular session of the legislature. In his opinion, Mr. Carmody said in part: "No provision is made for the filling of prescriptions by dentists or veterinarians, and such use of the drug as these two classes may make in their professions is therefore limited to that of direct personal administration. An attempt by a dentist or a veterinarian to use the drug by means of a prescription to be filled by a druggist is penalized by making it a misdemeanor for anyone not of the classes specifically authorized to have any of it in his possession without the certificate of the person making the sale, stating the name and address of the physician upon whose prescription the sale is made. I am therefore of the opinion that a druggist is not authorized to fill a prescription calling for cocain signed by a dentist or veterinarian, and that the use of the drug by dentists and veterinarians is limited to its purchase in original packages and direct administration to the patient."—*Albany (N. Y.) Press.*

Dental Dispensary for Albany, N. Y., Schools.—The city of Albany, N. Y., has developed an excellent system of "health direction in the public schools," which it is the aim of the medical director to extend considerably beyond the usual concept of mere medical inspection of school children. Recently a dental dispensary has been added which aims to take care of the teeth of children who are not able to pay for the services of a dentist. A set of card blanks has been provided for keeping a record of the dental work done for the pupils. One of the cards contains sociological data concerning the family from which the pupil comes. The cards given to the children recording appointments and granting admission to the dispensary contain practical admonitions to the pupil and parents as to the importance of taking care of the teeth, their influence on the physical and mental development, and the bearing of proper development on future success in life—all of which should have a wholesome educational influence. The school work in Albany is an example of how a scientific foundation along lines of school hygiene can be made successful through the co-operation of progressive citizens, trained educators, and child hygienists. The dental dispensary is not the least valuable department of this feature of the health work in the public schools.—EDITORIAL, *Journ. of Amer. Med. Association.*

Tonsillectomy in Children.—Riedel remarks that he had rather remove the gall-bladder, the appendix, or an ovarian tumor, than operate on a small, firmly embedded and friable tonsil. Tonsillectomy under such circumstances is a serious operation and requires general anesthesia. With ordinary enlarged tonsils local anesthesia may suffice even for children, but he has never attempted it, as he dreads the child's crying. The general anesthesia has to be profound for a short interval, which of course is not without its dangers. The blood swallowed during the operation may be vomited afterward and give cause for alarm, as it is supposed to be the dreaded "hemorrhage." He has known of the pillars being sutured together on this account when there was really no tendency to hemorrhage. He has attempted tonsillectomy a few times in acute tonsillitis, but found the tonsils too soft and friable to be removed. He warns in conclusion that an imperfect operation is worse than none. A diseased tonsil must be removed *in toto* down to a small bit of sound tissue, which he always tries to save. He prefers a stout, unbendable, heavy and straight clamp, 22 cm. long and 5 and 13 mm. broad, with three teeth. This leaves his right hand free for the knife. —*Münch. Med. Wochenschrift* per *Journ. of Amer. Med. Association.*

Amalgams Containing Silver and Tin.—It was again shown that the aging of alloys of silver and tin is not due to superficial oxidation. A bar of alloy does not age appreciably even after fifteen days at 115°, whereas filings of the same bar are aged after half an hour at 100°. Hence it is concluded that aging is not due to any uncatalyzed polymorphic change in the Ag_3Sn contained in the alloy. It was also proved that aging is not due to absorption of oxygen by the fillings. A further hypothesis to be tested is that it may be due to catalytic action of the iron or products of iron introduced during the filing.

The equilibrium of the metals, silver, tin, and mercury, at temperatures of 63°, 90°, 166°, and 214°, has also been studied. The liquidus has been completely determined at these temperatures, and consists of a line roughly parallel to the Sn-Hg side of the equilateral triangle. At 63° this line only extends about one-tenth of the distance across the diagram, whereas at 214° it stretches nearly the whole way across. The solidus has not, as yet, been determined accurately, but there are good reasons for considering that, commencing at the point Ag_3Hg_4, it extends across the diagram roughly in the direction of Ag_3Sn. It has been proved that the substances represented by points on the solidus must be solid solutions.—W. A. KNIGHT and R. A. JOYNER, *British Dental Journal.*

Preparation of Patients for Analgesia.—The preparation of the patient for an analgesic should consist in abstinence from food for at least three hours previous to operation; emptying of the bladder; loosening of all tight clothing, corsets, etc., and instruction in the method of breathing through the nasal inhaler until a tingling or numbness is felt, and then breathing through the mouth to prevent the further development of numbness. It is often a good plan to allow the patient to take the nasal inhaler and draw through it three or four breaths, to familiarize him with the sensation which has been explained to him, before any attempt is made to do actual work.

The posture should be so that accumulations of saliva, dust, etc., will not readily run down the throat, but come forward and be removed by the ejector. If it becomes necessary to adjust a rubber dam in the mouth, the admixture of air must be regarded by the operator himself, since the patient is then only able to breathe through the mouth. The patient indicates by raising his finger or hand when pain is felt, so that the operator may adjust the air intake at the nasal inhaler, and administer a richer mixture until deeper analgesia is secured.

In analgesia it is best not to insert a mouth-prop, because it annoys and tires the patient and prevents the closing of the mouth, which is an early sign of too deep analgesia. —E. I. MCKESSON, *Dental Summary.*

The Care of Infants' Mouths.—The mucous membrane of the mouth of the infant is very tender and sensitive, and often the seat of various superficial lesions, consequently in cleansing the mouth of the infant care must be exercised not to injure or in any way abrade the surface. The gums of the nursing infant are often studded with epithelial pearls, which are in reality tiny retention cysts. These cysts may disappear by resorption or rupture spontaneously, and usually heal without marked symptoms. These minute lesions, however, may become infected from the presence of disease-producing micro-organisms growing in the mouth, resulting in ulcerated patches of more or less extent, which are sore and painful and frequently prevent the child from nurs-

ing, and in serious cases lead to grave forms of disease and sepsis.

The uncared-for mouth of the child is never free from particles of coagulated and fermenting milk, which are the soil upon which many forms of harmful micro-organisms grow and flourish. These organisms often attack the minute lesions above referred to, and thus establish a follicular stomatitis. It stands to reason, therefore, that if the cause can be excluded by keeping the mouth clean, the disease will be prevented. Nearly all the forms of stomatitis that affect infants and small children may be traced to an unclean condition of the mouth. This being the fact, no argument is needed to establish the relationship between cause and effect.—J. G. O'NEIL, *Dominion Dental Journal.*

The Shading of Silicate Cement Fillings.—The common practice in placing silicate fillings is to pick a shade which most nearly corresponds to the shade of the tooth, or, if the shades supplied do not suit the case, to blend two or more of the powders till the desired shade is obtained.

The weakness of this method of shading is that a solid shade is obtained. In many approximal cavities it is found, for instance, that the shade at the neck of the tooth is yellow, while that at the incisal edge is blue. To place a filling of either of these shades produces a poor match at the cervical or incisal margins, depending upon which shade has been used.

It is a well-known fact that, in baking a porcelain inlay for such a case, the different shades of porcelain are laid on in such a way that a solid color is not the result, but a blending of colors from the bluish tint at the incisal to the yellow at the cervical margin.

This same artistic result may be obtained in the silicate if, instead of mixing the powders, two separate mixes are made, the operator making one and his assistant the other. The yellow mix is placed in the cavity first, filling it full at the cervical margin where the yellow shade is desired, but only partially filling it at the incisal margin. The bluish shade is then placed over the yellow at the incisal margin, giving in the complete filling a blending of shades, which corresponds to those of the tooth.

In a labial cavity, in a tooth somewhat uneven in color, or stained in spots, a silicate filling of a solid shade cannot be placed without being somewhat conspicuous. If two mixes are made in this case, one of the foundation shade of the tooth and the other of the shade of the discoloration, a most artistic result may be obtained. The foundation shade is placed in the cavity and then, here and there, small pieces of the other mix are mixed in. The finished filling will have an uneven color, corresponding to that of the tooth.—*Good Health.*

Teeth or Books? Free Dentistry More Useful Than Free Libraries.—Why not give away free teeth instead of free libraries, Mr. Carnegie? The health of the nation would be vastly improved in consequence, for there is a much closer connection than most people suspect between decayed teeth and disease.

The Southwark coroner recently gave striking emphasis of this point. Holding an inquest on a man who had only two teeth and died, because he could not properly digest his food, the coroner suggested that it would be much better if millionaires, instead of giving money for free libraraies and universities, did something for poor people who have bad teeth.

"Emphatically, yes. I think it would be a most useful thing," declared Mr. Atkins, the secretary of the British Dental Association. "There is no wholesale provision made for dealing with the teeth of the poor, and it is, of course, a great problem. The most suitable recipients, in the first instance, of any large donations of the kind, would be the leading dental hospitals of London and the provinces. The hospital price, I believe, for a complete set of teeth is £4, as a rule."

Mr. A. W. Davis, the general secretary of the London Hospital Saturday Fund, said to the *Daily Sketch:* "All the consumption hospitals, hospitals for women and children, and similar institutions, are now insisting that teeth should be attended to before they will admit patients for treatment. They are even appointing dentists to see to this work. This is a recent development which indicates the necessity of the further provision of dentistry for the poor."

To a limited extent, efforts are already being made in this direction. Besides the Hospital Saturday Fund, dental treatment for the poor is now being provided by Guy's Hospital Samaritan Fund, Royal Dental Hospital, and the Surgical Aid Society.

The Samaritan Fund, administered in connection with Guy's Hospital, provides a certain number of free sets of artificial teeth for its poorer patients, to the extent of three or four hundred a year. Guy's has, of course, a big dental school, where the work is mainly done.—*Daily Sketch* per *Dental Surgeon.*

HINTS, QUERIES, AND COMMENTS.

THE BLACKENING OF TEETH IN JAPAN.

THE accompanying illustrations are reproductions of the two sides of a small paper bag, actual size, containing a tooth-blackening paste, and purchased in Yokohama, Japan, in 1892, by Mr. E. Russell Jones of Philadelphia, who also kindly furnished the translation given below of the Japanese inscriptions.

FIG. 1.

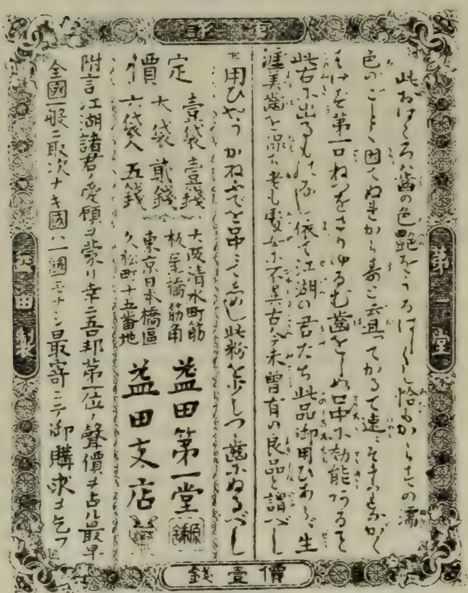
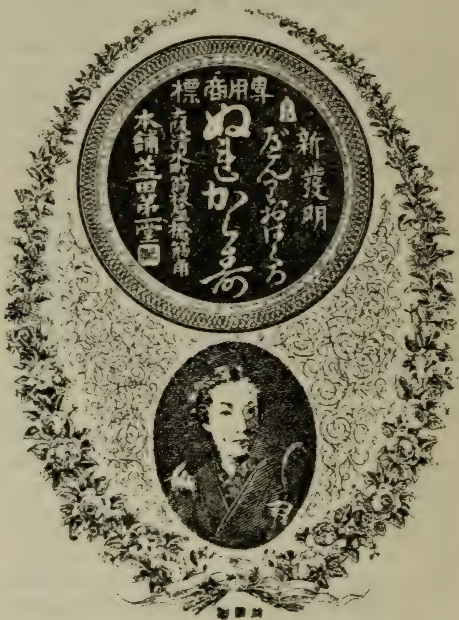


FIG. 2.



[*Translation.*]

THIS TOOTH-BLACKENING PASTE beautifies the teeth. Its jet black effect is like the color of the crow when it is wet; hence its name —WET CROW. Easy to manipulate—stains quickly—does not wash off. It drives away the feverish condition in the mouth; tightens loose teeth. Nothing can surpass this powder in keeping the oral cavity in hygienic condition. Therefore, ladies and gentlemen, use this powder, and you will have beautiful teeth all your life, the old will be like the young maiden. Hence this is the best powder that has ever been discovered.

Directions: With metal or wire brush apply it on the teeth a little at a time.

Price: One package, 1 cent; large package, 2 cents; package containing six small packages, 5 cents.

STORES: Main Store—Shimizu Machi, corner of Itayabashi, Osaka. Branch—Nippon bashi Ku, 15 Hisamatsu Machi, Tokyo.

NOTICE!

Dear Sirs,—By your kind patronage our store ranks first in the popular estimation, and our agents are represented in every part of the country. We beg of you to purchase it at your first opportunity.

NEW DISCOVERY.—Convenient [or handy] tooth paint, WET CROW [name of the paint].

(Patented trade-mark.)

OSAKA: Shimizu Machi [street], Itayabashi [main store], MASUDA DAI ICHI-DO.

The Japanese custom of blackening the teeth or making prosthetic pieces bearing artificial black teeth has frequently been mentioned. Regarding the scope and significance of this custom, Dr. L. Ottofy, in an article on "Dentistry in Japan" published in the *Dental Review*, Chicago, September 15, 1899, p. 714, says: "The practice of blackening the teeth as a symbol of the marital state, on the part of the women, is becoming obsolete, yet a number still continue the practice, and I have seen a cleverly made plate, the missing incisor having been made of black rubber, neatly carved to resemble its neighbor; full sets of black teeth are thus made, without using any teeth at all." Ottofy omits to mention the fact that large quantities of black artificial porcelain teeth were at one time exported from America to Japan.

A very interesting and authoritative comment on the blackening of the teeth among the Japanese is given in an article on "Dentistry in Japan," by Dr. Atsuhiko Katayama of Yokohama, Japan, published in the *Dental Review*, Chicago, May 1890, p. 318, as follows:

"They made two kinds of plates, white plate teeth and black plate teeth, the former being for men and unmarried women, the latter for married women only. It will not be out of place here to tell why our Japanese women blackened their teeth after marriage, and how it was done. The substance with which the teeth are blackened is a solution made by dissolving a piece of iron in acid. When they apply it to their teeth, the substance is first rubbed on with a brush, then a little powdered tannic acid is applied with the brush, and this is repeated until the teeth are thoroughly black.

"As we dentists know, the enamel of human teeth is very hard and smooth, so that it cannot retain any coloring matter on it long; consequently, if a woman has well-developed enamel, it is almost impossible for her to keep her teeth black, but, on the contrary, badly developed enamel retains the coloring matter for several days. The coloring matter adhering to the enamel is entirely dependent upon the good or bad development of the enamel; therefore, if a woman has well-developed enamel, she uses a diluted solution of acetic or sulfuric acid, which she applies with a brush. This she does first to roughen the surface, after which she proceeds to blacken her teeth; these operations are repeated until she succeeds.

"We do not know exactly when the custom of blackening the teeth began, but we can suppose it had its origin in the sixteenth or seventeenth century, when the country was so much disturbed by her civil wars. At that time many of the feudal chiefs of the emperor were scattered around the country, living in obscurity or privacy, and as they were known to be both brave and patriotic, a feeling of dislike crept into the people's hearts against the inactive and unsoldierly literary men. The military art was exalted and flourished vigorously. The women, reflecting the men's opinions, selected the brave military men for husbands instead of the sedate literary men.

"If once married, though the husband immediately lost his life on the battlefield, the bereaved wife never married again, and this should be remembered, to the honor of our women's lives. Then began the practice of blackening the teeth after marriage; this was the sign that the wife's virtue was sacred to her husband, and also the oath that no future marriage would ever take place. The reason given for blackening the teeth is quite poetical: It appears that teeth once blackened never resume their natural color, and that women once married are never unmarried. This custom is almost entirely unseen at the present time except among old women."

MIXTURE OF TRICRESOL, FORMALIN, AND OIL OF CLOVES IN THE TREATMENT OF PUTRESCENT ROOT-CANALS.

For some two years previous to last fall, I had been using tricresol and formalin, equal parts, in the treatment of putrescent root-canals. I found it necessary, however, to be cautious, as the result in some cases was not all one would wish for. The treatment set up severe irritation and sometimes prolonged pericementitis of a serious nature, though in other cases the results were good. This convinced me that the tricresol and formalin combination, though invaluable for the treatment of putrescent root-canals,

needed modifying in some way. In my search for a third suitable constituent, I selected oil of cloves. Since using this essential oil as a third agent, I have had no trouble of a serious nature. Once in a while, patients complain of a little iritation, which is, however, not serious enough to warrant removal of the temporary stopping. According to some patients' accounts, this irritation lasts only from one to two hours; in the majority of cases no soreness whatever results.

My method of manipulating the tricresol-formalin-oil-of-cloves dressing is as follows: A wisp of cotton on a smooth broach is dipped first into pure oil of cloves, any excess being dried off, then into the tricresol and formalin mixture, is carried into the canal, and sealed with temporary stopping. Often the case will not need a second treatment, which, of course, is left to the operator's judgment. The results with this form of treatment have been most satisfactory to my patients and myself, and it is hoped that others will find them equally favorable.

WM. H. H. BECKWITH, D.D.S.
Halifax, N. S.

BINDING MAGAZINES.

EVERY progressive dentist realizes the immense value of bound files of the dental magazines to which he subscribes, especially those which publish a comprehensive annual index. As books of reference, these files are invaluable, if the owner has once learned how to look for the special subjects upon which he wishes information that is usually of a kind not to be found in even the most comprehensive text-books. Not everyone, however, cares to incur the expense of a bookbinder's bill, and for these, Dr. Wright B. Lee of Junction City, Oregon, offers the following practical suggestion:

"One magazine is fastened to the other by wire brads of from one-half to one inch length driven near the back margin of the magazines. These brads are clinched so that they will not scratch the table or injure the hands. Each new issue is thus added to the former ones, until a volume for one-half or one whole year is completed, this to be governed by the thickness of the monthly issues, and the owner's preference for one very thick or two more handy volumes. When one volume is completed, the fastening can be rendered more substantial by driving a few extra long brads. No difficulty will be encountered in driving the brads. If necessary, a small round bur revolved in the electric engine will facilitate the nailing procedure."

A more substantial, and just as cheap and convenient form of binding is suggested in *Popular Mechanics*, as follows:

"To bind magazines, for rough service, proceed as follows: Place the magazines carefully one on top of the other in order, and space the upper one, near the back edge, for two rivets, marking off three equal distances, or perhaps the center space longer than the other two. Make two holes through all the magazines on the marks with an awl, or drill, then drive nails of the right length through them. Use small washers on both ends of the nails under the head and at the point, which is cut off and riveted over. This makes a good, serviceable binding for rough use."

This form of binding can be improved upon by using stiff cardboards of suitable size to protect the upper and under surfaces of the volume, and by employing a long bolt threaded for a nut, instead of nails and washers.

There are a great many so-called catalog binders in the market, all of which are reasonable, preserve magazines very well, and present a neat appearance.

COMBINATION AMALGAM AND CEMENT FILLING.

IN badly broken-down posterior teeth, where it is advisable to place a permanent filling, and where but poor retention can be had, I have found the following mixture to be serviceable as a filling material.

Amalgam is mixed, and the excess of mercury pressed out. The mix is placed in a mortar, and a quantity of zinc oxyphosphate cement powder, equal in bulk to the amalgam mix, is added. The amalgam and cement powder are thoroughly mixed in the mortar, and the resulting mass is incorporated in a sufficient quantity of cement liquid to make it workable, and placed in the cavity.

This filling material combines the adhesive

quality of cement with the strength and permanence of the amalgam.

LOUIS B. LIPPMAN, D.D.S.

New York City.

CLAUDE MARTIN FUND.

FROM the amount over-subscribed for the erection of a monument to the memory of Prof. Claude Martin, late of Lyons, France, a fund has been created for a prize to be awarded triennially by the French Academy of Medicine.

The handsome monument to Martin was erected in the cemetery of Saint-Cyr-au-Mont-d'Or, near Lyons, and unveiled with fitting ceremonies on June 29, 1913, in presence of notable representatives of the French dental and medical professions.

OBITUARY.

DR. JOHN W. MOFFITT.

DIED, February 27, 1914, in Harrisburg, Pa., of old age, in his seventy-ninth year, JOHN W. MOFFITT, D.D.S.

Dr. John W. Moffitt, a well-known pioneer of modern dentistry, has crossed to the Great Beyond.

He was the son of the Rev. John J. Moffitt, D.D., and Charlotte (Eppley) Moffitt, and was born at Orwigsburg, Pa., on June 5, 1835. Before he had attained his second year, his father removed to the West, and settled in Ohio. Early dentists often combined two callings, and his father practiced dentistry in addition to attending to his ministerial duties.

Dr. John W. Moffitt received the usual public school education of the period, and afterward attended Bethany College, Va.

He early evinced an aptitude and enthusiasm for dental art. After a period of pupilage with his father, also with Dr. Samuel Hullein of Wheeling, Va., being thus instructed in the then jealously guarded mysteries of dental art and practice, he opened an office at Cadiz, Ohio, in 1853.

In 1855 Dr. Moffitt went on a trip through part of South America and the western part of the United States, and remained for some time in California. Returning home late in 1857, he married, and took up a dental practice in Harrisburg, Pa. Since then, until prevented by the state of his health a few years ago, he had continued in active practice, except during his service as a Union soldier in the civil war. When under fire at the battle of Antietam, he received orders to report at Hagerstown, Md., as an assistant hospital surgeon, and served in that capacity until honorably discharged in 1864.

Dr. Moffitt was one of our earliest porcelain specialists. Over sixty years ago he carved and baked porcelain blocks and teeth for his own use and that of the profession, out of materials dug up and compounded by himself. Afterward he supervised the manufacture of teeth on a large scale for some of the early manufacturers, personally carving the models, molding, casting and finishing the bronze molds, and baking the teeth. He was always a strong advocate for high-fusing porcelain.

Ceramics was one of his hobbies. In 1860 he was awarded a patent for non-sectional block work baked on platinum. This he later abandoned to the profession through the Odontographic Society of Philadelphia. Another patent covered a tooth for continuous-gum work, as now practiced. He also obtained a patent for a tooth for rubber and plastic plates. Quite recently he introduced a method of attaching teeth to the platinum plate without soldering in continuous-gum work.

The first bayonet-shaped forceps were made by a Philadelphia firm from a pattern cut out in wood and submitted by him, and many old forceps bear the imprint of his name.

Dr. Moffitt's modesty and retiring disposition kept him from claiming the honors

for a great many dental inventions. He was a veritable encyclopedia of means and methods in the preparation of dental necessities, and his fund of information was willingly shared with all.

Obturators and artificial vela were a most successful branch of his practice, and quite recently he made an ingenious and important improvement in the construction of the latter.

He did not often place his ideas in print, although a few articles from his pen, chiefly on porcelain, appeared in dental journals.

He was one of the first delegates to the American Dental Association, and at its meeting at Nashville, Tenn., in 1870, represented the Pennsylvania State Dental Society. He was an officer and charter member of the Pennsylvania State Dental Society, the Lebanon Valley Dental Society, etc., and in fact outlived a number of societies in which he was once prominent. He was also a member of the Masonic fraternity.

Dr. Moffitt had a leading part in obtaining from the Pennsylvania legislature the charter for the Philadelphia Dental College, in which he matriculated in 1864. He, however, did not present himself for examination for his degree until 1888, when he was graduated. In this institution he acted as demonstrator in prosthetics and porcelain, with some short intermissions, for over forty years, and hundreds of successful practitioners can look back gratefully to his instruction.

He was married in Harrisburg, Pa., on December 20, 1857, to Harriet R. Wenrick. He is survived by a brother and a nephew, Dr. J. J. Moffitt, of Harrisburg, Pa.

Interment was in Harrisburg Cemetery on March 2, 1914.

T. J. McLernon.

DR. MORDECAI HIATT FLETCHER.

Died, March 26, 1914, Mordecai H. Fletcher, D.D.S., M.D., M.S., of hemorrhage of the brain, in his sixty-fifth year.

Dr. Mordecai Hiatt Fletcher was born in Richmond, Ind., September 18, 1849. His early life was spent in or near Richmond. He attended the country district school in the winter up to the age of fourteen years. He was then apprenticed to a jeweler in Richmond for four years, and at the termination of his apprenticeship started an independent business. About this time he attended Earlham College, Richmond, Ind. From 1870–79 he lived in New York, St. Louis, and Richmond.

He began the study of dentistry under Dr. J. W. Jay of Richmond, Ind., in 1877. In the autumn of 1879, he entered the Ohio Dental College, Cincinnati, Ohio, being graduated in the spring of 1880.

He made a trip to Europe in the summer of 1882.

He was graduated from the Miami Medical College in 1884, having done all dental and medical college work while practicing dentistry.

His research work began with his medical work, and was largely done in biology, including pathology. He has published no books, but has written and read many papers, mostly reports of original research work in physiology and pathology; these have nearly all been published in various dental and medical journals. He served for six years as a member of the Ohio State Board of Dental Examiners—anatomy, histology, and pathology being his subjects.

In 1887, by request, he read a paper before the Oral Surgery Section of the Ninth International Medical Congress, held in Washington, D. C., on "Newgrowth of the Pulp Chambers of Teeth of Mammalia," embodying the result of seven years' investigation.

In 1893, he was elected chairman of the Section on Oral Surgery of the Pan-American Medical Congress. For fifteen years he served in some capacity as committeeman or officer in the American Medical Association. He presented a paper before that section almost every year for the last twenty years. In one of these papers he pronounced as untenable the process of implantation. A paper describing his experiments in this field was written for the Tenth International Medical Congress, held in Berlin in 1890.

More recently his investigations have been concerned with diseases of the human mouth and teeth, and their connection with the accessory air-cavities of the nose and face and their bearing upon the general health. In July 1895 he finished a course and received an academic degree in electrical science and electro-therapeutics in the National School of Electricity.

For more than twenty-five years he was closely connected with the management of the

Cincinnati Society of Natural History. Most of this time he was a member of its board of managers, serving five terms as president.

In 1891, he took a course in embryology at Earlham College, and gave a course at the same time in photo-micrography.

In 1903, Earlham College bestowed on him the honorary degree of Master of Science, in view of his achievements in scientific research. He took also a course in bacteriology at Ann Arbor under Professors Vaughn and Novy.

On Thursday, March 26, 1914, while attending to the needs of a patient, Dr. Fletcher suffered a hemorrhage into the brain, from which he did not rally, his death occurring on the same day.

At a meeting of the Cincinnati Dental Society the following *in memoriam* was adopted:

When the Cincinnati Dental Society extends to the family of Dr. M. H. Fletcher its sympathy in their bereavement, it does so with a deep sense of its own loss at the passing away of one of its most beloved and inspiring members. The consolation in which the society takes refuge and which it begs the family of Dr. Fletcher to share, is the consciousness that his life was of unusual happiness, his professional career honorable and successful in the highest degree.

It was a privilege to have known so perfect a gentleman. The influence of his rare mind and character was widely felt. By its passing, not only the profession to which Dr. Fletcher contributed so much distinction, but the community at large, has suffered a great loss.

The inspiration of his lofty ideals, the helpfulness of contact with such a master of the profession, the joy of companionship with a nature so genial, will be sorely missed by this society. But his memory will live long in the hearts of his brothers, and will always be synonymous with the highest standards of excellence in conduct and in professional skill.

C. Stanley Smith,
J. R. Callahan,
Sidney J. Rauh, *Committee.*

DR. G. ARTHUR SAVAGE.

G. Arthur Savage, D.D.S., died after a brief illness with pneumonia in Worcester, Mass., on Sunday, April 5, 1914, in his forty-second year. He was born in Worcester, Mass., being the son of Dr. George E. and Winifred (Morgan) Savage. He graduated from the Pennsylvania College of Dental Surgery, May 2, 1900, and after his graduation traveled extensively in this country and in Europe, incidentally working with several prominent dentists in the development of his special interest in porcelain work as adapted to bridge work, inlays, and jacket crowns, in which department he had developed an excellent technique and a high degree of skill.

DR. E. VINCENT SHADOMY.

Died, at his home, Denver, Colo., February 4, 1914, E. Vincent Shadomy, D.D.S., in his forty-seventh year.

Dr. Shadomy was born at Queensville, Ind., on July 30, 1867, and was a graduate of the class of '02 of the Colorado College of Dental Surgery, as well as a member of its faculty. He leaves a wife and one child.

The following resolutions of regret at his demise were passed at the regular monthly meeting of the board of directors of the Colorado College of Dental Surgery, February 5, 1914:

Resolved, That we, the board of directors of the Colorado College of Dental Surgery, feeling deeply the loss we have sustained in the death of Dr. E. V. Shadomy, a graduate of this school and a member of its faculty, do hereby express our great sorrow; and be it further

Resolved, That this memorial be sent to the bereaved family, and a copy spread upon the minutes of this board, and one sent to the dental journals for publication.

"IN MEMORIAM" RESOLUTIONS.

Dr. Geo. W. Cook.

The following resolutions were passed by the Odontological Society of Chicago upon the decease of their eminent *confrère:*

Whereas, the Odontological Society of Chicago is once more called upon to record the death of one of its most eminent members—Dr. George Washington Cook, who died December 21, 1913; and

Whereas, the members of the Odontological Society of Chicago, in meeting assembled,

fully realizing that a link of inestimable friendship has been suddenly snapped in the affairs of society relationship, most fully recognize in their expression of bereavement that the life of Dr. Cook was one of love and unceasing devotion to scientific investigation. His numerous contributions to dental literature specially evidenced the mental activity of a well-trained mind. Therefore be it

RESOLVED, That these resolutions be spread upon the records of this society, and that a copy be sent to the family of the deceased, and also that a copy be sent to the various dental journals for publication.

J. E. HINKINS,
J. G. REID.

Dr. Chas. A. Meeker.

THE following resolutions were passed by the members of the New Jersey State Board of Registration and Examination in Dentistry in memory of their distinguished colleague:

Whereas, in the providence of an All-wise Creator, our fellow-member, Dr. CHARLES A. MEEKER, died September 8, 1913; and

Whereas, his indefatigable industry, his record as an examiner, and his skill as an organizer and systematic developer of the New Jersey State Board work for a period of time covering twenty years, have combined to place him without a peer among eminent examiners; now therefore be it

RESOLVED, That we, the members of the New Jersey State Board of Registration and Examination in Dentistry, deeply deplore his loss, and express our great appreciation of his long and intelligent services; and be it further

RESOLVED, That a page of our minute-book be inscribed with these resolutions, and a copy of the same be sent to his bereaved widow, and to the professional journals for publication.

HERBERT S. SUTPHEN, *Pres.*,
ALPHONSO IRWIN, *Sec'y*,
WM. E. TRUEX,
VERNON D. ROOD,
CORNELIUS KIEL,
CHAS. P. TUTTLE.

Brief Necrology.

Dr. PIERRE L. REMY of New Iberia, La., on January 14, 1914.

Dr. W. H. CHAFFEE of Tallapoosa, Ga., on February 2, 1914, in his eightieth year.

Dr. LINDLEY M. MOORE of Chicago, Ill., on January 19, 1914, of kidney trouble.

Dr. EZEKIEL LEE of Idaho Falls, Idaho, on December 27, 1913, in his fifty-fifth year.

Dr. E. ALMOND LEONARD of Santa Fé, N. M., on December 2, 1913, of tuberculosis.

Dr. R. HENRY WILSON of Lebanon Junction, Ky., on October 14, 1913, in his seventy-third year.

Dr. GEORGE H. RUSSELL of Keene, N. H., on November 26, 1914, of arterio-sclerosis, in his seventieth year.

Dr. ALFRED DWIGHT GODDARD of Brooklyn, N. Y., on December 30, 1913, of pneumonia, in his fifty-second year.

Dr. GEORGE R. BARDWELL of Belle Plaine, Ohio. Deceased was a graduate of the Chicago College of Dental Surgery.

Dr. EVERETT W. UMBERGER of Winchester, Va., on February 22, 1914, of cerebral hemorrhage, in his sixty-first year.

Dr. CHARLES M. BUCKEY of Washington, D. C., on November 27, 1913, in an accident while hunting, in his fifty-fifth year.

Dr. WILLIAM BALDWIN KEYES of London, Eng., on August 2, 1913. Deceased was at one time dentist to the Emperor of Brazil.

Dr. RAY LAMOREE of Akron, Ind., on February 11, 1914, of heart disease. Deceased was a graduate of the Indiana Dental College.

Dr. JAMES GRANGER of Mayville, N. Y., on December 21, 1913, in his seventy-fourth year. Deceased was a graduate of the Pennsylvania Dental College.

Dr. PETER B. RAMSEY of Richmond, Va., on February 17, 1914. Deceased was a graduate of the Meharry Dental College of Nashville, Tenn.

Dr. CORNELIUS V. MALLORY of Pittsburgh, Pa., on February 10, 1914, of heart failure. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. T. MERRILL WILLIAMS of Mount Vernon, Iowa, on February 16, 1914, in his fortieth year. Deceased was a graduate of the Louisville College of Dentistry.

Dr. CHARLES EMIL JOHNSON of Chicago, Ill., on December 14, 1913, in his thirty-eighth year. Deceased was a graduate of the Northwestern University Dental School.

Dr. WILLIAM H. OVERMEYER of Chicago, Ill., on December 15, 1913, in his fortieth year. Deceased was a graduate of the Northwestern University Dental School.

Dr. TERRENCE W. COYLE of Baltimore, Md., on January 27, 1914, in his seventy-third year. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. JAMES T. SAVERY of Philadelphia, Pa., on February 2, 1914, of pneumonia in his thirty-fifth year. Deceased was a graduate of the Philadelphia Dental College.

Dr. WILLIAM E. WOLFRUM of West Bend, Wis., on December 4, 1913, in his forty-seventh year. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. NEIL M. CULBRETH of Wilmington, N. C., on September 1, 1913, of spinal trouble. Deceased was a graduate of the University of Tennessee, College of Dentistry.

Dr. HARRY R. BELL of Greenfield, Ohio, on November 8, 1913, of a paralytic stroke, in his fifty-third year. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. MELVIN A. NEITZEL of Washington, Kans., on January 8, 1914, of abscess of the liver, in his thirty-third year. Deceased was a graduate of the Philadelphia Dental College.

Dr. FRANK T. ARMSTRONG of Estherville, Iowa, on January 27, 1914, of apoplexy, in his forty-third year. Deceased was a graduate of the Northwestern University Dental School.

Dr. EDMUND LORD of Philadelphia, Pa., on November 30, 1913, of heart disease, in his fifty-fourth year. Deceased was a graduate of the University of Pennsylvania, School of Dentistry.

Dr. WILLIAM M. HERRINGTON of San Francisco, Cal., on November 12, 1913, in his forty-first year. Deceased was a graduate of the College of Dentistry, University of California.

Dr. MALCOLM J. WINN of Columbus, Ohio, on December 18, 1913, of aneurysm, in his fortieth year. Deceased was a graduate of the Howard University Dental College of Washington, D. C.

Dr. JAMES THOMAS LINDSAY of Dustin, Okla., on July 5, 1913, in his twenty-third year. Deceased was a member of the Oklahoma State Dental Society, and at one time vice-president of the Southwest Missouri Dental Society.

Dr. GEORGE W. WIEDHOFFT of Chicago, Ill., on January 19, 1914, of heart disease. Deceased was a graduate of the Columbian Dental College of Chicago, and, at the time of his demise, president of the Chicago Dental Laboratory Company.

Dr. G. A. BILLOW of Dayton, Ohio, on December 15, 1913, of blood poisoning, in his fiftieth year. Deceased was a graduate of the Ohio College of Dental Surgery, and a member of the board of the Ohio Medical University, College of Dentistry.

Dr. JACOB F. FRANTZ of New Rochelle, N. Y., on February 8, 1914, in his fifty-third year. Deceased was a graduate of Hahnemann Medical College of Philadelphia, and, at the time of his demise, president of the Dentists' Supply Co. of New York.

Dr. WM. S. CARRUTHERS of Galveston, Tex., on February 20, 1914, in his eighty-second year. Deceased was a graduate of the Baltimore College of Dental Surgery, and a veteran of the civil war. He was the first president of the Texas Dental Association.

Dr. ADDISON B. ROBINSON of Grand Rapids, Mich., on November 30, 1913. Deceased was a graduate of the University of Michigan, College of Dental Surgery, member of the E. S. Holmes Dental Club, and at one time secretary and president of the state board of dental examiners.

Death of Dr. Gorgas.

WE have received notice of the death of Dr. F. J. S. GORGAS, which occurred April 8th. A sketch of his career will appear in the next issue of the COSMOS.—ED.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS: May, June, and July.

MAY.

Canadian Dental Association. Winnipeg, Man. Four days: May 26th to 29th.

Dental Society of the State of New York. Albany. Three days: May 14th to 16th.

Iowa State Dental Society. Des Moines. Three days: May 5th to 7th.

Lake Erie (Pa.) Dental Association. Cambridge Springs. Three days: May 21st to 23d.

Massachusetts State Dental Society. Boston. Three days: May 7th to 9th.

National Dental Protective Association. Washington, D. C. May 19th.

South Dakota Dental Society. Sioux Falls. Two days: May 12th and 13th.

Susquehanna (Pa.) Dental Association. Delaware Water Gap. Three days: May 26th to 28th.

Vermont State Dental Society. Rutland. Three days: May 21st to 23d.

JUNE.

American Medical Association—Section on Stomatology. Atlantic City, N. J. Five days: June 22d to 26th.

California State Dental Association. Camp Curry. Four days: June 29th to July 2d.

Colorado State Dental Association. Manitou. Three days: June 25th to 27th.

Georgia State Dental Society. Atlanta. Three days: June 4th to 6th.

Louisiana State Dental Society. Baton Rouge. Three days: June 4th to 6th.

Maine Dental Society. Augusta. Three days: June 25th to 27th.

Mississippi Dental Association. Vicksburg. Three days: June 23d to 25th.

Montana State Dental Society. Great Falls. Three days: June 11th to 13th.

N. D. A.—Southern Branch. Atlanta, Ga. Three days: June 4th to 6th.

New Hampshire Dental Society. Weirs. Three days: June 17th to 19th.

North Carolina Dental Society. Hendersonville. Three days: June 24th to 27th.

Northern Ohio Dental Association. Cleveland. Three days: June 4th to 6th.

Pennsylvania State Dental Society. Philadelphia. Three days: June 30th to July 2d.

South Carolina State Dental Association. Chick Springs. Three days: June 17th to 19th.

JULY.

American Dental Society of Europe. Paris. July 30th to August 1st.

American Society of Orthodontists. Toronto, Can. Three days: July 2d to 4th.

Florida State Dental Society. Atlantic Beach. Three days: July 1st to 3d.

National Dental Association. Rochester, N. Y. Four days: July 7th to 10th.

National Association of Dental Examiners. Rochester. July 6th.

New Jersey State Dental Society. Ocean Grove. Four days: July 15th to 18th.

Examiners' Meetings.

Alabama Board of Examiners. Selma. June 2d.

Arkansas Board of Examiners. Little Rock. June 8th and 9th.

California Board of Examiners. San Francisco. June 5th. Los Angeles. June 17th.

Connecticut Dental Commissioners. Hartford. June 18th to 20th.

Florida Board of Examiners. Jacksonville. June 26th to 30th.

Illinois Board of Examiners. Chicago. June 11th.

Indiana Board of Examiners. Indianapolis. June 15th to 19th.

Iowa Board of Examiners. Iowa City. June 1st.

Maine Board of Examiners. Augusta. June 23d and 24th.

Maryland Board of Examiners. Baltimore. May 27th and 28th.

Massachusetts Board of Registration. Boston. June 3d to 5th.

Michigan Board of Examiners. Ann Arbor. June 15th to 20th.

Mississippi Board of Examiners. Jackson. June 16th to 18th.

Montana Board of Examiners. Great Falls. June 11th to 13th.

New Jersey Board of Examiners. Trenton. June 29th to July 1st.

North Carolina Board of Examiners. Hendersonville. June 22d.

Ohio State Dental Board. Columbus. June 16th.

Oklahoma Board of Examiners. Oklahoma City. June 11th.

Pennsylvania Board of Examiners. Philadelphia and Pittsburgh. June 10th to 13th.

South Carolina Board of Examiners. Chick Springs. June 12th.

South Dakota Board of Examiners. Sioux Falls. July 7th.

Tennessee Board of Examiners. Nashville. June 15th to 19th.

Texas Board of Examiners. Dallas. June 22d.

Vermont Board of Examiners. Montpelier. June 29th.

Washington State Board of Examiners. Seattle. (Some time in May.)

Wisconsin Board of Examiners. Milwaukee. June 22d.

NATIONAL DENTAL ASSOCIATION.

The 1914 session of the National Dental Association will be held in Rochester, N. Y., July 7 to 10, 1914. The Local Committee have selected the Powers Hotel as the headquarters and have made the other necessary arrangements for a large attendance.

This is the first meeting of the association under the reorganization, and the House of Delegates, the governing body, will meet at 10.30 A.M., July 6th.

The officers and committees are expecting to present an exceptionally interesting program, the details of which, together with the other arrangements, will appear in the later journals and the next number of our Official Bulletin.

Homer C. Brown, *President*,
Columbus, Ohio.
Otto U. King, *Gen. Sec'y*,
Huntington, Ind.

From the Local Committee of Arrangements.

Notwithstanding this early date, a great deal of interest is being manifested in the eighteenth annual session of the National Dental Association, which meets in Rochester, N. Y., July 7, 8, 9, and 10, 1914.

Those who have the program in charge are meeting with exceptionally good success in securing eminent authorities as essayists and clinicians, and report that there will be much of value for every member of our profession who can be present.

The Local Committee have decided upon Powers Hotel for headquarters, and arrangements are already well under way to care for the holding of all meetings and clinics in a manner to secure the greatest comfort of all.

Preparations are under way to make this a meeting of great interest. Rochester is known throughout the land as a convention city. It is conveniently located, which is most desirable for those wishing to visit the mountains, lakes, and many other points of historical interest.

There will be plently of opportunity for our guests to enjoy themselves while at the convention, not only because of the many facilities in the city itself, but also on account of Rochester's proximity to Lake Ontario and her many pleasure resorts.

For the autoist, Rochester is a paradise, for it is the hub of a network of improved roads that are unsurpassed throughout the length and breadth of the land.

Full information will be gladly furnished if you will write the Local Committee.

Edward G. Link, *Chairman*,
226 Cutler Bldg., Rochester, N. Y.,
William W. Smith,
Benedict S. Hert,
Louis Meisberger,
Chas. L. Brininstool.

AMERICAN DENTAL SOCIETY OF EUROPE.

Annual Meeting—Paris, July 30th.

The forty-first annual meeting of the American Dental Society of Europe will be held in Paris, France, July 30, 31, and August 1, 1914, at the Hotel Continental. All members of the profession are cordially invited to be present.

G. B. Hayes, *Sec'y*.

Sixth International Dental Congress.

London, August 3 to 8, 1914.

Patron: HIS MAJESTY THE KING.

THE Sixth International Dental Congress will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and to the self-governing Dominions of the Empire to send official representatives to the congress.

The Committee of Organization (appointed under Art. XVI of the International Dental Federation) has completed the list [following] of Sections, Officers, and Subjects for Report and Debate. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

The International Dental Congress Museum is intended to be representative of every section of the congress. [See page 651.]

A Demonstrations Committee is being organized, with Mr. T. A. Coysh as chairman and Mr. W. F. Mellersh as hon. secretary.

Independent papers and demonstrations: These must be notified, before April 15th, to the secretary of the appropriate section, the council of which has the right to make selection and to decline any not desired. Notifications received after April 15th can be considered only after the program has been arranged subject to selection by the president of the section. Fifteen minutes will be allowed for the reading of a paper.

Papers may be written in English, French, or German, and must be delivered to the secretary of the section concerned, preferably typewritten and ready for printing. An abstract or summary to reach the secretary of the section *before June 1st.* Notices of demonstrations, including a list of the demonstrator's requirements, by same date.

Copyright of communications to the congress becomes the property of the Committee of Organization.

Reports: In each section a time will have been reserved for the discussion of important, selected questions, each discussion being introduced by one or more "reporters" chosen by the council of the section. The manuscripts of reports must be typewritten and must be sent in before April 15th, so that they may be printed and distributed as soon as possible to all members who have been enrolled. Reports will not be read *in extenso.* Each reporter will be allowed fifteen minutes for an opening *résumé* and ten minutes in closing discussion. For other speakers, a maximum of five minutes.

The hon. secretaries of Section IX would be glad to hear from gentlemen in all countries willing to give *short* demonstrations of lantern slides. [See page 651.] It is hoped to make this a valuable feature.

The Rules make eligible for membership all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of that in which they practice.

At the closing meeting (Saturday, August 8th) the President will submit the amended constitution of the International Dental Federation to the vote, and will announce the place and date of the next congress.

The subscription for members will be 30s. (38 francs; 31 marks; $7.50); for members of their families accompanying them, 15s. (19 francs; 15½ marks; $3.75).

Subscriptions (by postal order, draft or check) payable to the treasurer Sixth International Dental Congress, who will send a formal receipt. (With application, inclose card, with dental or medical qualifications and titles, and full postal address—any change in which must be immediately notified.)

Members will receive the official program, the daily journal of the congress, the catalogs of the exhibitions, and the Transactions.

Correspondence should be addressed to the Officers of the Congress, as follows:

HON. GENERAL SECRETARIES,
Sixth International Dental Congress,
19 Hanover Square, London, W.

ORGANIZATION.

Officers.

President: J. Howard Mummery, M.R.C.S., L.D.S.Eng.

Vice-Presidents: W. B. Paterson, L. Matheson, W. Guy, Dr. A. W. W. Baker, and the President of the British Dental Association.

President of Committee of Organization: W. B. Paterson, F.R.C.S., L.D.S.Eng.

Hon. Treasurer: H. Baldwin, M.R.C.S., L.D.S.Eng.

Hon. General Secretaries: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.D.S.Eng.; H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.

Committee of Organization.

H. R. F. Brooks, J.P., L.D.S.Edin., Glas. and I.; Wm. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.; Walter Harrison, L.D.S., D.M.D.Harvard; J. Howard Mummery, M.R.C.S., L.D.S.; W. B. Paterson (president of the committee), F.R.C.S., L.D.S.

Appointed by the British Dental Association.

J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.; H. Baldwin, M.R.C.S., L.D.S.; Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.; Walter H. Coffin; W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.; A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.; Montagu F. Hopson, L.D.S.; L. Matheson, L.D.S.; Frank J. Pearce, L.D.S., D.D.S.Penn. (hon. secretary of the committee); G. O. Whittaker, L.D.S.

THE SECTIONS.

Section I.—Dental Anatomy, Histology, and Physiology.

OFFICERS.

President: A. S. Underwood, M.R.C.S., L.D.S.Eng.

Hon. Presidents: Monsieur J. Choquet, Paris; Dr. M. H. Cryer, Philadelphia, U.S.A.; Hofrat Professor Dr. O. Walkhoff, Munich.

Vice-President: D. E. Caush, L.D.S.I.; J. Humphreys, L.D.S.I., M.D.S.Birm.; and J. A. Woods, L.D.S.Eng., M.D.S.Liv.

Hon. Secretaries: E. C. Sprawson, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. W. Wellings, L.D.S.Edin., B.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

The Evolution of the Human Dentition.

Calcification.

Chemistry and Physiology of Saliva.

Section II.—Dental Pathology and Bacteriology.

OFFICERS.

President: A. Hopewell-Smith, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Cavalié, Bordeaux; Dr. T. B. Hartzell, Minneapolis, U.S.A.; and Professor Dr. Römer, Strassburg.

Vice-Presidents: F. J. Bennett, M.R.C.S., L.D.S.Eng.; J. Lewin Payne, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. W. Watson, L.D.S.Edin.

Hon. Secretaries: S. P. Mummery, L.R.C.P., M.R.C.S., L.D.S.Eng., and A. G. G. Plumley, M.B.Lond., L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Etiology of Dental Caries.

The Etiology and Pathology of "Pyorrhea Alveolaris."

The Pathology of the Antrum.

Pathological Conditions of the Dental Pulp.

Discussion on the British Dental Association Odontome Catalog.

Section III.—Dental Surgery and Therapeutics.

OFFICERS.

President: W. H. Dolamore, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Dieck, Berlin; Dr. E. S. Gaylor, New Haven, U.S.A.; Dr. Pont, Lyons.

Vice-Presidents: W. Hern, M.R.C.S., L.D.S.Eng.; J. B. Parfitt, L.R.C.P., M.R.C.S., L.D.S.Eng.; and G. O. Whittaker, L.D.S.Eng.

Hon. Secretaries: F. N. Doubleday, L.R.C.P., M.R.C.S., L.D.S.Eng.; and W. Parker Harrison, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) The Inflammatory Diseases of the Gingival Margin and Periodontal Membrane (pyorrhea alveolaris).

(*a*) The clinical signs.

(*b*) Local treatment.

(*c*) Treatment by ionic medication.

(*d*) Treatment by vaccines.

Note.—It is particularly requested that all papers should be accompanied by photographs, radiograms, etc., demonstrating the progress of cases cited and the results of treatment.

(2) The Restoration of Lost Portions of Tooth Substance by Inlaying.

(*a*) Inlay materials and their manipulation.

(*b*) Principles of cavity preparation.

(*c*) The cement lute.

(*d*) Comparison of inlays with fillings.

(3) Oral Sepsis.

(*a*) Oral sepsis in relation to general disease.

(*b*) The prevention of oral sepsis.

(*c*) The treatment of oral sepsis.

(*d*) The question of crowns, bridges and dentures in relation to oral sepsis.

Section IV.—Dental Physics, Chemistry, Radiography, and Metallurgy.

OFFICERS.

President: Montagu F. Hopson, L.D.S.Eng.

Hon. Presidents: Dr. J. P. Buckley, Chicago, U.S.A.; Monsieur Franchette, Paris.

Vice-Presidents: C. A. Clark, L.D.S.I.; H. T. Dreschfeld, L.D.S.Edin.; and R. Lindsay, L.D.S.Edin.

Hon. Secretaries: W. B. Hepburn, L.D.S.Glas., and A. E. Ironside, L.R.C.P., M.R.C.S., L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Uses and Advantages of X Rays as an Aid to Diagnosis, including the differentiation of the radiographic appearances of normal and abnormal tissue.

The Structural and Other Changes Arising in Connection with Metals Used in the Mouth.

The Theory and Practice of Pressure Casting. This report will be taken at a conjoint meeting with Section V. The Reporters chosen for Section IV will deal with the *theory*.

Section V.—Dental Prosthesis.

OFFICERS.

President: W. Simms, L.D.S.I.

Hon. Presidents: Dr. D. O. M. LeCron, St. Louis, U.S.A.; M. Paul Martinier, Paris; Professor Dr. Riegner, Breslau.

Vice-Presidents: G. Brunton; D. P. Gabell, L.R.C.P., M.R.C.S., L.D.S.Eng.; G. J. Goldie, L.R.C.P.&S., L.D.S.Edin.

Hon. Secretaries: H. J. Morris, L.D.S.Eng., and Wilton Thew, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

Articulation and Articulators.

Design and Retention of Partial Dentures.

The Theory and Practice of Pressure Casting. Conjointly with Section IV. Reporters for Section V will deal with the *practice*.

Section VI.—Orthodontics.

OFFICERS.

Presidents: J. H. Badcock, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Dr. R. A. Day, San Francisco, U.S.A.; Dr. Leon Frey, Paris; Zahnarzt Schröder-Benseler, Cassel.

Vice-Presidents: G. G. Campion, L.D.S.Eng., G. Northcroft, L.D.S.Eng., D.D.S.Mich.; W. Rushton, L.D.S.Eng.

Hon. Secretaries: H. Chapman, L.D.S.Eng., D.D.S.Penn.; E. L. Councell, L.R.C.P., M.R.C.S., L.D.S.Eng., B.D.S.Liv.

SUBJECTS FOR REPORT AND DEBATE.

The Unification of Terminology and Classification.

The Problem of Retention, with a view to Permanence of Result and Minimum of Danger.

Nasal Obstruction in relation to Orthodontics; in two parts, viz: (*a*) The Effects of the Secretions of the Ductless Glands. (*b*) The Effect of the Expansion of the Dental Arches, With or Without the Opening of the Sutures.

Root Movement.

The Relative Advantages of Fixed and Movable Appliances.

Section VII.—Oral Surgery and Surgical Prosthesis.

OFFICERS.

President: J. G. Turner, F.R.C.S., L.R.C.P., L.D.S.Eng.

Hon. Presidents: M. Leon Delair, Paris; Dr. J. D. Patterson, Kansas City, U.S.A.; Sch.-Rat Professor Dr. Partsch, Breslau; Professor Dr. Schröder, Berlin.

Vice-Presidents: T. S. Carter, L.D.S.Eng.; W. W. James, F.R.C.S., L.R.C.P., L.D.S.Eng.; G. M. P. Murray, F.R.C.S.I.

Hon. Secretaries: H. P. Aubrey, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. Barritt, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

(1) Surgical Prosthesis of the Jaws.

(2) Late Results of Cleft Palate Operations.

(3) Treatment of Dental and Dentigerous Cysts.

One morning will be devoted to each subject; the rest of the time will be devoted to papers on subjects of surgical interest in the mouth.

Section VIII.—Anesthesia (General and Local).

OFFICERS.

President: W. Guy, F.R.C.S., L.R.C.P., L.D.S.Edin.

Hon. Presidents: Dr. T. P. Hinman, Atlanta, U.S.A.; Dr. J. Vichot, Paris; Professor Dr. Williger, Berlin.

Vice-Presidents: J. H. Gibbs, F.R.C.S., L.D.S.Edin.; W. A. Hunt, L.R.C.P., M.R.C.S.; J. W. Pare, M.D., C.M.Edin., L.D.S.Eng.

Hon. Secretaries: F. Coleman, L.R.C.P., M.R.C.S., L.D.S.Eng.; A. H. Parrott, L.D.S.Eng., L.D.S.Birm.

SUBJECTS FOR REPORT AND DEBATE.

Gas and Oxygen, alone, in mixture, and in sequence, for the Extraction Operation.

Gas and Oxygen Analgesia for Conservative Operations.

Local Anesthesia with special reference to (*a*) Methods, (*b*) Drugs, (*c*) Sphere of Usefulness, (*d*) Contra-indications and Dangers.

Section IX.—Oral Hygiene, Public Instruction, and Public Dental Services.

OFFICERS.

President: Norman G. Bennett, M.A., M.B., B.C.Cantab., L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Presidents: Professor Dr. Jessen, Strassburg; Dr. Siffre, Paris; Dr. Herbert L. Wheeler, New York City.

Vice-Presidents: A. E. Baker, L.R.C.P., M.R.C.S., L.D.S.Eng.; Walter Harrison, L.D.S.Eng., D.M.D.Harv.; J. Sim Wallace, D.Sc., M.D., C.M.Glas., L.D.S.Eng.

Hon. Secretaries: C. F. Peyton Baly, L.R.C.P., M.R.C.S., L.D.S.Eng.; W. R. Wood, L.R.C.P., M.R.C.S, L.D.S.Eng.

SUBJECTS FOR REPORT AND DEBATE.

The Effects of Dental Treatment on National Health and Physique.

Prophylaxis at Different Ages.

Lantern demonstration of slides showing (*a*) Means of affording Public Instruction in Dental Hygiene, *e.g.* lecture material, charts, etc.; (*b*) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or other Institutions in which public dental treatment is being carried out. To be contributed to by all countries willing to send representatives. It is intended that many dentists should exhibit slides showing the working of institutions, or of public instruction, and very briefly describe them.

Section X.—Dental Education.

OFFICERS.

President: W. H. Gilmour, L.D.S.Eng., M.D.S.Liv.

Hon. Presidents: Dr. Conrad Cohn, Berlin; Dr. Henry W. Morgan, Nashville, U.S.A.; Dr. Maurice Roy, Paris.

Vice-Presidents: T. Gaddes, M.D.Denver, L.D.S.Eng. and Edin.; F. W. Richards, L.D.S.Eng.; R. Wynne Rouw, L.R.C.P., M.R.C.S., L.D.S.Eng.

Hon. Secretaries: F. B. Bull, L.D.S.Eng.; G. Sheppard, L.D.S.Eng., F.R.C.S., L.M.I., L.R.C.P.I.

SUBJECTS FOR REPORT AND DEBATE.

The Teaching of Bacteriology for Dental Students, with special reference to (*a*) the Method of Teaching; (*b*) the Extent of the Teaching.

A Practical Synopsis of Medical and Surgical Teaching for Dental Students.

First Principles in Practical Teaching.

Methods of Teaching Orthodontics to Dental Students.

Sixth International Dental Congress.

THE CONGRESS MUSEUM.

Its Nature and Scope.

The Museum will be an international collection of objects of interest, and be representative of every section of the congress. Its nature and scope include—

1. Specimens showing the Evolution of Tooth Forms and of the Dentition of Man. Histological Preparations bearing upon recent research. Exhibits illustrating the Chemical Composition and Physiological Action of the Saliva.

2. Specimens of Morbid Conditions of the Teeth, Palate, Gums, and Jaws, such as Odontomes, Dental and Dentigerous Cysts, New Growths, Diseases of the Periodontal Membrane, etc. Photomicrographs of Oral Micro-organisms, and Cultures of Micro-organisms in Test Tubes or in Petri Dishes. New Bacteriological Apparatus and Appliances.

3. Specimens of Teeth, Gums, and Jaws affected by "Pyorrhea Alveolaris." Microscopical and Lantern Slides of the same. Exhibits of Various New Methods of Inlaying Cavities in Teeth. Exhibits of New Methods of Crowning Teeth.

4. Radiographs of the Normal Dental Tissues, and of Diseases of the same and Associated Parts.

5. Exhibition of various kinds of Articulators. Specimens showing the various Methods of "Pressure Casting." Specimens showing Modern Forms of Continuous-Gum Work.

6. Models showing Abnormalities in Position of the Teeth, and Appliances for the Corection of the same.

7. Specimens illustrating Methods of Dealing with Surgical Conditions of the Teeth and Jaws, including Cleft Palate, Hare-lip, Fracture and Resection of the Jaws.

8. Specimens illustrating the History and Evolution of Anesthesia.

9. Photographs, Charts, Diagrams, Specimens, and Statistics of School Clinics. Methods in the Instruction of the Public in the principles of Oral Hygiene.

10. Instruction Forms, Charts, Diagrams, Specimens, and Demonstration Models used in relation to Dental Education. The Specimens will include those employed for teaching purposes, and also Specimens of Work of both Students and Pupils, completed in accordance with the definite courses given.

11. Historical Objects of Interest, such as Books, Instruments, Pictures, etc.

Dr. A. Hopewell-Smith, chairman, earnestly invites co-operation in making this Museum of the Congress a success, and will be happy to forward the "Regulations," with "application and entry form" for intending exhibitors. Write him at International Dental Congress Office, 19 Hanover Square, London, W.

Sixth International Dental Congress.

ARRANGEMENTS OF THE AMERICAN NATIONAL COMMITTEE

APPOINTED BY THE NATIONAL DENTAL ASSOCIATION.

THE committee having in charge the affairs of the congress relating to the United States have selected the following to take part in the congress program:

Addresses.

Dr. H. J. BURKHART, Batavia, N. Y. Address on behalf of the National Dental Association at the opening session.

Dr. EDWARD C. KIRK, Philadelphia, Pa. Address before the general session, on the afternoon session of the opening day. Subject, "The Tendencies in Dental Education."

Reporters.

SECTION I: *Dental Anatomy, Histology, and Physiology.*

"The Evolution of the Human Dentition." Dr. I. N. Broomell, Philadelphia, Pa.

"Calcification." Dr. A. R. Starr, New York, N. Y.

"Chemistry and Physiology of Saliva." Dr. Edward C. Kirk, Philadelphia, Pa.

SECTION II: *Dental Pathology and Bacteriology.*

"The Etiology of Dental Caries." Dr. B. Holly Smith, Baltimore, Md.

"The Etiology and Pathology of 'Pyorrhea Alveolaris'." Dr. Percy R. Howe, Boston, Mass.

"Pathological Conditions of the Dental Pulp." Dr. R. W. Bunting, Ann Arbor, Mich.

"The Pathology of the Antrum." Dr. Chas. H. Oakman, Detroit, Mich.

SECTION III: *Dental Surgery and Therapeutics.*

"Inflammatory Diseases of the Gingival Margin and Periodontal Membrane: Pyorrhea Alveolaris." Dr. T. Sidney Smith, Palo Alto, Cal.

"Restorations of Lost Portions of Tooth Substance by Inlaying." Dr. R. Ottolengui, New York, N. Y.

"Oral Sepsis in Relation to General Disease." Dr. C. N. Johnson, Chicago, Ill.

"The Prevention of Oral Sepsis by Treatment." Dr. J. D. Patterson, Kansas City, Mo.

SECTION IV: *Dental Physics, Radiography, and Metallurgy.*

"The Uses and Advantages of X Rays as an Aid to Diagnosis, including the Differentiation of the Radiographic Appearances of Normal and Abnormal Tissue." Dr. Howard R. Raper, Indianapolis, Ind.

"The Structural and Other Changes Arising in Connection with Metals Used in the Mouth." Dr. Clarence J. Grieves, Baltimore, Md.

"The Theory and Practice of Pressure Casting." Dr. Weston A. Price, Cleveland, Ohio.

SECTION V: *Dental Prosthesis.*

"Articulation and Articulators." Dr. J. H. Prothero, Chicago, Ill.

"Design and Retention of Partial Dentures." Dr. H. J. Goslee, Chicago, Ill.

SECTION VII: *Oral Surgery and Surgical Prosthesis.*

"The Late Results of Cleft-Palate Operations." Dr. Truman W. Brophy, Chicago, Ill.

"The Treatment of Dental and Dentigerous Cysts." Dr. Wm. Carr, New York, N. Y.

"Surgical Prosthesis of the Jaws." Dr. M. C. Smith, Lynn, Mass.

SECTION VIII: *Anesthesia, General and Local.*

"Gas and Oxygen, Alone, in Mixture, and in Sequence, for the Extraction Operation." Dr. Chas. K. Teter, Cleveland, Ohio.

"Gas and Oxygen Analgesia for Conservative Operations." Dr. Thos. B. Hartzell, Minneapolis, Minn.

"Local Anesthesia with Special Reference to (a) Methods, (b) Drugs, (c) Sphere of Usefulness, (d) Contra-indications and Dangers." Dr. Eugene R. Warner, Denver, Colo.

SECTION IX: *Oral Hygiene, Public Instruction, and Public Dental Service.*

"The Effects of Dental Treatment on National Health and Physique." Dr. Herbert L. Wheeler, New York City.

"Prophylaxis at Different Ages." Dr. A. R. Melendy, Knoxville, Tenn.

"Lantern Demonstration of Slides, showing (a) Means of Affording Public Instruction in Dental Hygiene, *e.g.* Lecture Material, Charts, etc.; (b) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or Other Institutions in which Public Dental Treatment is being Carried Out." Dr. Wm. A. White, Phelps, N. Y.

SECTION X: *Dental Education.*

"Methods of Teaching Orthodontics to Dental Students." Dr. S. H. Guilford, Philadelphia, Pa.

The following have been selected as

Honorary Presidents of Sections.

I. *Dental Anatomy, Histology, and Physiology.* Dr. Mathew H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. LeCron, London, England.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

A list of essayists and clinicians will be published later.

The committee invite the ethical members of the profession of the United States to become members of the congress. Membership, which includes admission to the congress sessions and a copy of the proceedings, is $7.50, and for members of their families accompanying them $3.75.

Dr. Herbert L. Wheeler, 560 Fifth ave., New York City, has been appointed by the committee to arrange for steamship rates, sailing dates, itinerary, etc. Those desiring to attend the congress, sailing with the American delegation—immediately following the meeting of the National Dental Association, Rochester, N. Y., which closes July 10, 1914—are requested to correspond with Dr. Wheeler.

[See also notice from Committee on Transportation, next page.]

TRUMAN W. BROTHY, *Chairman,*
WM. CARR,
S. H. GUILFORD,
WALDO E. BOARDMAN,
Committee.
BURTON LEE THORPE, *Sec'y,*
3605 Lindell Boulevard, St. Louis, Mo.

Sixth International Dental Congress.

COMMITTEE ON TRANSPORTATION

Has arrangements with the International Mercantile Marine Co., comprising the American, Atlantic Transport, Leyland, Red Star, White Star, and White Star-Dominion lines, whose fleet includes such large, splendid and steady steamers as the "Olympic," "Oceanic," "Adriatic," "Baltic," "Cedric," "Celtic," "Lapland," "Minnewaska," "Minnehaha," "Minnetonka," "Minneapolis," "Laurentic," and "Megantic," sailing to and from numerous prominent ports in England and the Continent. Our delegates receive 25 per cent. reduction on all the I. M. M. Co. steamers sailing east on and after July 9th, and to August 20th from Great Britain and Europe, except the "Olympic" August 19th from Southampton and Cherbourg for New York.

When the concession would bring the price for passage below the minimum rate of the steamer selected. the lowest rate of that steamer will be charged, as follows: *To* or *from*—

Plymouth, Cherbourg and Southampton: "Olympic," $130.00; "Oceanic," $110.00.

Queenstown and Liverpool: "Adriatic," $110.00; "Baltic," "Cedric," and "Celtic," $100.00.

Dover and Antwerp: "Lapland," $97.50; other Red Star line steamers, $85.00.

Plymouth, Cherbourg, and Southampton, "Majestic," $95.00.

London, Atlantic Transport line, $85.00.

Between Montreal–Quebec–Liverpool, "Laurentic" and "Megantic," $92.50.

Communicate at once as to reservations with International Mercantile Marine Co., 9 Broadway, New York City, stating dates of proposed outward and return sailings, also accommodation requirements. Applications filled in order of receipt. A deposit of 25 per cent. of eastbound passage money required when reservation is made, balance payable three weeks prior to outward sailing.

The committee will also reserve dining-saloon seats, steamer chairs and rugs, the deck chairs and rugs renting at $1.00 each for the voyage. Seats can also be reserved on the trains to London. for which the rates. first class, are as follows: Via Southampton, $2.75; Plymouth, $7.50; Liverpool, $7.00; Dover, $4.75.

The committee also calls the attention of delegates to the "travelers' checks" issued by the International Mercantile Marine Co. in denominations of $10.00, $20.00, $50.00, $100.00 and $500.00, which will be found the safest and most convenient way of carrying funds, as the checks are accepted by hotels, shops, banks, etc., throughout Great Britain and Europe.

As the White Star sailings available for the congress, from New York, are on July 9th, 16th, 18th, arrangements have been made with the Holland-American line for those who wish to sail on Tuesday, 14th, to do so on their steamer "New Amsterdam," on which is allowed a discount of 25 per cent. on the tariff rate, for all rooms on deck A (except the *chambres de luxe*), with the understanding that each room be occupied by three passengers. On decks B and C they will place at our disposal all outside and inside rooms we require, at the minimum rate per berth, provided that each room be occupied by three passengers.

HOTELS.

Arrangements for accommodation at undermentioned or any hotels can be made through Thos. Cook & Son, 245 Broadway, New York. Minimum rates are quoted: special prices prevail for the more luxurious rooms.

Mention number of single or double rooms required and length of stay.

S = Single, without bath. *Sb* = Single, with bath.
D = Double, " " *Db* = Double, " "

Hyde Park Hotel: *S* $2.75 per day, *Sb* $4.50 per day, *D* $3.75 per day, *Db* $5.25 per day. Room with meat breakfast, *table d'hôte* lunch, and dinner, $5.75 per day and up.

Hotel Piccadilly: *S* $3.25 per day, *Sb* $5.25 per day, *D* $4.50 per day, *Db* $6.25 per day. Room with meat breakfast, *table d'hôte* lunch, and dinner, $6.25 per day and up.

Royal Palace Hotel: *S* $1.25 per day, *Sb* $3.75 per day, *D* $2.25 per day, *Db* $4.50 per day. Room with meat breakfast, *table d'hôte* lunch, and dinner, $3.50 per day and up.

For those who do not wish to stop at an hotel, "pensions" may be found in many sections of London.

Any further information will be furnished upon applying to 245 Broadway, New York City.

HERBERT L. WHEELER, *Committee*,
560 Fifth ave., New York City.

AMERICAN MEDICAL ASSOCIATION—

Section of Stomatology.

THE annual meeting of the American Medical Association will be held at Atlantic City, N. J., June 22 to 26, 1914. Following is the program for the Section of Stomatology:

TUESDAY, 2 P.M.

(1) Chairman's Address. Dr. William C. Fisher, New York, N. Y.

(2) "Mesothelial Tumors of the Jaw." Dr. Robert H. Ivy, Philadelphia, Pa.

Discussion—Dr. Robert P. Bay, Baltimore, Md.

(3) "Cystic Tumors of the Jaw." Dr. Gordon New, Rochester, Minn.

(4) "Differential Diagnosis of Major Mouth Lesions." Dr. Stewart L. McCurdy, Pittsburgh, Pa.

(5) "The Methods of Obtaining Dental Service in Hospitals by the Appointment of Internes." Dr. Herbert L. Wheeler, New York, N. Y.

WEDNESDAY, 2 P.M.

(6) "What Shall be the Content for a Course in Oral Surgery in Our Dental Schools." Dr. A. H. Levings, Milwaukee, Wis.

Discussion—Dr. Geo. V. I. Brown, Milwaukee, Wis.; Dr. Thomas Gilmer and Dr. F. B. Moorehead, Chicago, Ill.; Dr. M. I. Schamberg, New York, N. Y.; Dr. J. A. Pettit, Portland, Ore.; Dr. Vilray P. Blair, St. Louis; Dr. M. H. Cryer, Philadelphia, Pa., and Dr. Jas. G. Sharp, San Francisco.

THURSDAY, 9.30 A.M.

(7) "The Scientific Routine of Tooth Brushing and Mouth-cleaning." Dr. Joseph Head, Philadelphia.

(8) "Osteoplastic Surgery of the Face. Dr. Wayne W. Babcock, Philadelphia.

(9) "Fractures of the Inferior Maxilla." Dr. Henry S. Dunning, New York City.

(10) "Bacteriology of Alveolar Abscess." Dr. Thomas Gilmer, Chicago.

(11) "Acute Parenchymatous Glossitis." Dr. Virgil Loeb, St. Louis.

(12) "The Section of Stomatology as a Factor in the Evolution of Dental and Medical Science." Dr. Geo. V. I. Brown, Milwaukee.

THURSDAY, 2 P.M.

(13) "Mouth Infection as a Source of Systemic Disease." Dr. Frank Billings, Chicago.

Discussion—Dr. Edward C. Rosenow, Chicago; Dr. Charles H. Mayo, Rochester; Dr. Victor C. Vaughn, Ann Arbor, Mich.; Dr. Charles L. Mix, Chicago; Dr. Daniel H. Squire, Buffalo ("The Peridental Membrane as a Source of Infection"), and Dr. C. B. Craig, New York ("Mouth Infection in Relation to Nervous Affection").

We are exceptionally fortunate in having on the program of this meeting the gentleman whose original research work has correlated certain systemic diseases with mouth infections.

An effort will be made to harmonize the different methods of teaching oral surgery in our dental schools, and to formulate a comprehensive scheme for a uniform course of instruction.

A very attractive program is here offered, and those who are interested are cordially invited to be present and take part in the discussions.

EUGENE S. TALBOT, *Sec'y.*

AMERICAN SOCIETY OF ORTHODONTISTS.

THE annual meeting of the American Society of Orthodontists will convene in Toronto, Can., July 2, 3, and 4, 1914.

WM. ERNEST WALKER, *Sec'y,*
629-31 Maison Blanche, New Orleans, La.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE thirty-second annual session of the National Association of Dental Examiners will be held at the Rochester Hotel, Rochester, N. Y., beginning July 6, 1914, at 10 A.M., and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards are invited.

Hotel reservations should be made immediately, as the National Dental Association meets in Rochester during the week beginning July 6th, and the attendance undoubtedly will be large.

A. E. HONEY, *President,*
Kalamazoo, Mich.,
T. A. BROADBENT, *Sec'y,*
15 E. Washington st., Chicago, Ill.

AMERICAN MILLER MEMORIAL.

To the Dental Profession of America:

The committee appointed by the Ohio State Dental Society at the 1909 meeting for the purpose of raising funds for an American Memorial to the late Dr. W. D. Miller desire to make the following report:

Funds have been received from the following states: Alabama $25.00, Arizona $25.00, Arkansas $50.00, California $60.00, Colorado $82.00, Connecticut $50.00, Georgia $60.00, Illinois $531.00, Iowa $200.00, Indiana $75.00, Kansas $134.50, Kentucky $105.00, Maine $25.00, Massachusetts $100.00, Michigan $300.00, Minnesota $100.00, Missouri $100.00, Montana $15.00, Nebraska $100.00, New Hampshire $25.00, New Mexico $25.00, New York $125.00, Ohio $1303.00, South Carolina $25.00, North Dakota $50.00, South Dakota $15.00, Oklahoma $31.00, Oregon $50.00, Pennsylvania $20.00, Tennessee $50.00, West Virginia $25.00, Washington $50.00, Wisconsin $25.00, Wyoming $10.00, Texas $50.00, Utah $14.00, Vermont $20.00, Virginia $50.00 Total $4300.50; interest on this fund to December 1, 1913, amounts to $382.94, making a total in the hands of the treasurer, Dr. Weston A. Price, of $4683.44. Florida and Mississippi have each voted $50.00, but the amounts are not in the treasurer's hands at this date.

The Memorial will consist of an 8-foot bronze statue of Dr. Miller mounted on a 7-foot granite pedestal, to be placed on the lawn of the public library, the most appropriate site in the city of Columbus, the capital of Dr. Miller's native state. Suitable tablets will be prepared, and it is the desire of the committee to state on one that the monument is erected by funds from every state in the Union. If your state is not represented in the above list, we want your co-operation in placing it there.

It is hoped that sufficient funds—$5500.00—will be in the treasury that steps can be taken at once toward the construction of this memorial, that it may be finished and ready for unveiling at the 1915 meeting, which will be the fiftieth anniversary, of the Ohio State Society. The valuable co-operation of the honorary committees in the several states is hereby acknowledged; they have made this memorial a reality.

Other professions have done honor to their distinguished dead; let us do the same for Dr. Miller, whose life was one of unselfish devotion to the scientific advancement of dentistry.

Yours very truly,
Edward C. Mills, *Chairman*,
J. R. Callahan,
S. D. Ruggles,
Committee.

Columbus, Ohio, April 7, 1914.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

The Southern Branch of the National Dental Association will hold its next regular meeting at Atlanta, Ga., June 4 to 6, 1914, inclusive. The Local Committee of Arrangements have selected the Hotel Ansley as headquarters, and have the other necessary arrangements made for this meeting.

The new officers—W. A. Dean of Tampa, Fla., president; Jos. D. Eby of Atlanta, Ga., recording secretary, and Jesse L. Williams of Jacksonville, Fla., corresponding secretary—hope to make the 1914 meeting an unusual success.

W. A. Dean, *Pres.*,
Tampa, Fla.
Jesse L. Williams, *Sec'y*,
Jacksonville, Fla.

PRIZE COMPETITION

For Dental Essays.

The thirtieth anniversary of the *Oesterr.-ungar. Vierteljahrsschrift fuer Zahnheilkunde* (Petersplatz 7, Vienna I, Austria) begins with the year 1914. In commemoration thereof the editor offers three prizes—I, 1000 kronen (£40, $200); II, 600 kronen (£24, $120); III, 400 kronen (£16, $80)—for scientific work from any branch of dentistry, theoretical or practical, but awarded according to its clinical value. Herr Reg.-Rat Prof. Dr. Julius Scheff has accepted the chairmanship of the committee to award the prizes.

Rules. (1) The competition is open to dentists of all countries. In case the essay is in a foreign language a German translation must accompany it. (2) The essay must be original. (3) The essay must be sent in anonymously, bearing a certain word of identification, with a sealed envelope bearing the same word and containing the competitor's name and address. (4) The competition

closes May 15, 1914, and prizes will be awarded July 15, 1914. (5) The successful essays will be published in the *Oesterr.-ungar. Vierteljahrsschrift fuer Zahnheilkunde* when the size permits. (6) The editor reserves the right to publish at the customary remuneration any of the essays of unsuccessful competitors.

XI PSI PHI FRATERNITY.

PROPOSAL TO FORM AN ALUMNI ASSOCIATION OF PI CHAPTER (UNIV. PA.).

WE invite all graduate members of the Xi Psi Phi Fraternity of the University of Pennsylvania to aid in the formation of an Alumni Association of Pi Chapter and become members. The committee would be pleased to receive the names and addresses of all members, as our records are incomplete. We solicit your efforts in behalf of the Alumni Association of our fraternity, and will be glad to furnish any further particulars.

CHAS. STEFFENS, *Chairman*,
T. F. CARROLL,
3612 Walnut st., Phila., Pa.

VERMONT STATE DENTAL SOCIETY.

THE Vermont State Dental Society will hold its annual meeting in Rutland, Vt., May 21, 22, and 23, 1914.

P. M. WILLIAMS, *Sec'y.*

SOUTH DAKOTA STATE DENTAL SOCIETY.

THE regular annual meeting of the South Dakota Dental Society will be held at Sioux Falls, S. D., May 12 and 13, 1914.

O. W. HANSON, *Sec'y*,
Madison, S. D.

SUSQUEHANNA DENTAL ASSOCIATION.

THE Susquehanna Dental Association will meet at the Water Gap House, Delaware Water Gap, Pa., May 26, 27, and 28, 1914. Cross these dates off on your appointment book NOW. Further information will be given later.

W. C. MIDDAUGH, *Pres.*,
E. G. DONNEGAN, *Sec'y.*

CANADIAN DENTAL ASSOCIATION.

THE Canadian Dental Association meets for the first time in Winnipeg, Manitoba, May 26 to 29 inclusive, 1914, and a convention of unusual interest and profit is expected.

M. H. GARVIN, *Sec'y*,
Winnipeg, Man.

LAKE ERIE (PA.) DENTAL ASSOCIATION.

THE fifty-first annual meeting of Lake Erie Dental Association will be held May 21, 22, and 23, 1914, at Hotel Bartlett, Cambridge Springs, Pa.

C. L. MEAD, *Sec'y.*
Union City, Pa.

NATIONAL DENTAL PROTECTIVE ASSOCIATION.

THE annual meeting will be held in Washington, D. C., May 19, 1914, at the Dental Department of George Washington University, at 7.30 P.M., for the election of trustees and transaction of business.

E. P. DAMERON, *President*,
M. F. FINLEY, *Sec'y.*

MASSACHUSETTS STATE DENTAL SOCIETY.

FIFTIETH ANNUAL MEETING.

THE fiftieth anniversary of the Massachusetts State Dental Society will be held on May 7, 8, and 9, 1914, at Hotel Somerset, Boston, Mass.

A. H. ST.C. CHASE, *Sec'y*,
Everett, Mass.

IOWA STATE DENTAL SOCIETY.

THE fifty-second annual meeting of the Iowa State Dental Society will convene at Des Moines, Iowa, May 5, 6, and 7, 1914, beginning Tuesday, May 5th, at 9 A.M. Elaborate clinics and lectures and a large exhibit will be presented.

Further information will be furnished upon request from ethical practitioners of other states contemplating a visit to the meeting, to whom we extend a cordial invitation.

Exhibitors desiring space should apply to Dr. W. J. Cameron, Des Moines, Iowa.

C. M. KENNEDY, *Sec'y*,
Des Moines, Iowa.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE forty-sixth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., May 14, 15, and 16, 1914. The literary program will be rendered at the new State Educational building. The clinics will be given at the Hotel Ten Eyck and the dental exhibits in the hotel rooms, as was arranged for the 1913 meeting, which proved very satisfactory to the exhibitors.

An exceptionally attractive meeting is being arranged. A cordial invitation is extended to all ethical dentists in New York and sister states.

Exhibitors please address Dr. O. J. Gross, 404 Union st., Schenectady, N. Y., for space.

There will be the usual reduction of railroad rates on the certificate plan.

The Executive Council will meet at the Hotel Ten Eyck on Wednesday, May 13th, at 3 P.M.

For further information, address

A. P. BURKHART, *Sec'y*,
52 Genesee st., Auburn, N. Y.

MONTANA STATE DENTAL SOCIETY.

THE Montana State Dental Society will meet in Great Falls, Mont., June 11, 12, and 13, 1914.

F. W. ADAMS, *Sec'y*,
Billings, Mont.

NORTHERN OHIO DENTAL ASSOCIATION.

THE fifty-seventh annual session of the Northern Ohio Dental Association will be held at the Wigmore Coliseum, Cleveland, Ohio, Thursday, Friday, and Saturday, June 4, 5, and 6, 1914.

C. D. PECK, *Sec'y*,
Sandusky, Ohio.

COLORADO STATE DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of the Colorado State Dental Association will convene at Manitou, Colo., June 25, 26, and 27, 1914. A cordial invitation is extended to all ethical practitioners to attend our meeting.

Clinicians and exhibitors desiring accommodations will please address Dr. E. I. Backus, 719 Exchange National Bank Building, Colorado Springs, Colo. Any other information will be cheerfully furnished by the secretary.

GEO. Y. WILSON, *President*,
Colorado Springs, Colo.
EARL W. SPENCER, *Sec'y*,
Pueblo, Colo.

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at the New Hotel Weirs, Weirs, N. H., June 17, 18, and 19, 1914.

E. H. ALBEE, *President*,
LOUIS I. MOULTON, *Sec'y*,
Concord, N. H.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE forty-sixth annual meeting of the Pennsylvania State Dental Society will be held at the Bellevue-Stratford Hotel, Philadelphia, on June 30, July 1 and 2, 1914.

LUTHER M. WEAVER, *Sec'y*,
7103 Woodland ave., Phila.

NORTH CAROLINA DENTAL SOCIETY.

THE North Carolina Dental Society will hold its next annual meeting in Hendersonville, N. C., June 24 to 27, 1914.

J. MARTIN FLEMING, *Sec'y*,
Raleigh, N. C.

GEORGIA STATE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Georgia State Dental Society will convene at the Ansley Hotel, Atlanta, Ga., June 4, 5, and 6, 1914, beginning Thursday, June 4th, at 10 A.M.

The Georgia Society meets with the Southern Branch of the National Dental Association. Most excellent papers will be read, and clinics given well worth observation.

All ethical practitioners throughout the country are extended a cordial invitation. Any further information cheerfully furnished.

M. M. FORBES, *Sec'y*,
803-04 Candler Bldg., Atlanta, Ga.

MAINE DENTAL SOCIETY.

THE forty-ninth annual meeting of the Maine Dental Society will be held at the New Augusta House, Augusta, Me., June 25, 26, and 27, 1914.

I. E. PENDLETON, *Sec'y*,
Lewiston, Me.

LOUISIANA STATE DENTAL SOCIETY.

THE thirty-sixth annual meeting of the Louisiana State Dental Society will be held in Baton Rouge, La., June 4, 5, and 6, 1914.

E. B. DUCASSE, *Sec'y*.

MISSISSIPPI DENTAL ASSOCIATION.

THE thirty-ninth annual meeting of the Mississippi Dental Association will be held in Vicksburg, June 23, 24, and 25, 1914.

M. B. VARNADO, *Sec'y*,
Osyka, Miss.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE forty-fourth annual meeting of the South Carolina State Dental Association will be held at the Chick Springs Hotel, Chick Springs, S. C., on June 17, 18, and 19, 1914.

All ethical practitioners invited to attend.

The clinic will be in charge of Dr. I. M. Hair, Greenville, S. C., who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. P. Carlisle, Greenville, S. C.

Any other information will be cheerfully furnished by

W. BUSEY SIMMONS, *Sec'y*,
Piedmont, S. C.

CALIFORNIA STATE DENTAL ASSOCIATION.

THE annual meeting of the California State Dental Association will be held at Camp Curry, in the Yosemite Valley, in joint meeting with the Southern California Dental Association, on June 29 and 30, July 1 and 2, 1914. The Southern Pacific R. R. Co. will furnish a special train, which will leave San Francisco Sunday morning, June 28th, at 7.40 o'clock, arriving at Camp Curry at 5 P.M. the same day, thereby assuring a daylight trip and an opportunity of viewing the beautiful scenery *en route*. This train will be composed of standard steel chair cars, baggage cars, necessary number of diners, and buffet observation car. For further and detailed information as well as for transportation and accommodations at Camp Curry, application should be made to

E. EVANS, *Sec'y*.
Union Savings Bank Bldg., Oakland, Cal.

NEW JERSEY STATE DENTAL SOCIETY.

THE twin cities by the sea—Ocean Grove and Asbury Park—will again entertain the members and guests of the New Jersey State Dental Society. The forty-fourth annual convention of the society will be held in the North End Hotel, Ocean Grove, N. J., on July 15, 16, 17, and 18, 1914, beginning at 10 A.M. on Wednesday, July the 15th.

The North End Hotel is one of the largest and finest on the Jersey coast, and is situated directly on the beach front at the foot of Wesley lake and within a moment's walk of the Asbury Park Casino and trolley. Connected with the hotel by a bridge over the boardwalk is a large pavilion built over the ocean. The second floor of this pavilion will be devoted exclusively to exhibits and clinics.

Dr. Walter F. Barry, 220 Essex ave., Orange, N. J., is chairman of the Exhibit Committee, and has made an ideal arrangement of space for the exhibits. Dr. Barry will be glad to furnish information regarding the rates and space still available.

The clinics will be in charge of Dr. James I. Woolverton, 228 W. State st., Trenton, N. J. Plenty of space will be available, so that crowding will be avoided and everyone will have a chance to see the clinics.

The meetings of the society and the reading of papers will take place in the hotel either in the American dining room or in the picture theater, as will be announced in the program, which will be issued about July 1st.

At the hotel end of the bridge a room will be reserved for the officers of the society as headquarters, and this will be the executive office and bureau of information during the convention.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH, *Sec'y*,
430 E. State st., Trenton, N. J.

FLORIDA STATE DENTAL SOCIETY.

THE Florida State Dental Society will hold its annual meeting at Atlantic Beach Hotel, Atlantic Beach, Fla., July 1, 2, and 3, 1914. All ethical dentists cordially invited to attend. Any other information will be gladly furnished by

ALICE P. BUTLER, *Corresponding Sec'y*,
Gainesville, Fla.

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirty-first annual meeting of the Minnesota State Dental Association will occur in Duluth, Minn., August 6, 7, and 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

BENJAMIN SANDY, *Sec'y*,
Minneapolis, Minn.

WASHINGTON STATE BOARD OF EXAMINERS.

THE Washington State Board of Dental Examiners will meet in May 1914 at Seattle, Wash.

PASCAL W. YEARSLEY, *President*,
Spokane, Wash.
R. L. MOAK, *Sec'y*,
Montesano, Wash.

OKLAHOMA BOARD OF EXAMINERS.

CHANGE OF DATE OF MEETING.

THE next regular meeting of the Oklahoma Board of Dental Examiners will be held at Oklahoma City, beginning Thursday, June 11th. All applications must be filed with the secretary ten days prior to date set for examination, and must be accompanied by a diploma from some reputable dental college.

For full particulars and application blanks address

E. E. HEFLIN, *Sec'y*,
Oklahoma City, Okla.

MASSACHUSETTS BOARD OF REGISTRATION.

A MEETING of the Massachusetts Board of Registration in Dentistry will be held in Boston, Mass., June 3, 4, and 5, 1914. For applications and other information apply to

G. E. MITCHELL, *Sec'y*,
14 Water st., Haverhill, Mass.

IOWA BOARD OF EXAMINERS.

THE next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, commencing at 9 A.M., June 1, 1914. For application blanks and particulars write

J. A. WEST, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

MARYLAND BOARD OF EXAMINERS.

THE Maryland Board of Dental Examiners will meet for the examination of candidates for certificates May 27 and 28, 1914, at the dental department of the University of Maryland, Baltimore, at 9 A.M.

For application blanks and further information apply to

F. F. DREW, *Sec'y*,
701 N. Howard st., Baltimore.

ALABAMA BOARD OF EXAMINERS.

THE Board of Dental Examiners of Alabama will meet at Selma, Ala., on the morning of June 2, 1914.

Examinations will be both theoretical and practical; all theoretical examinations must be in writing.

Applicants must furnish instruments and material for any work required by the board; must be twenty-one years of age, of good moral character, and must present to the board diploma or satisfactory evidence that he or she has graduated in dentistry at some college of dentistry recognized by the National Association of Dental Faculties.

W. J. REYNOLDS, *Sec'y*,
Parrish Building, Selma, Ala.

SOUTH CAROLINA BOARD OF EXAMINERS.

THE next annual meeting of the South Carolina State Board of Dental Examiners will be held at Chick Springs, S. C., beginning Friday, June 12, 1914, at 10 A.M.

Examinations are theoretical and practical on regular college branches. Applicants must furnish instruments and material for any demonstrations called for by the board, and must exhibit diploma from a reputable dental college before being registered for examination.

For further information, address

R. L. SPENCER, *Sec'y*,
Bennettsville, S. C.

INDIANA BOARD OF EXAMINERS.

THE next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house, at Indianapolis, Ind., beginning June 15th, and continuing five days. For further information and blanks address

F. R. HENSHAW, *Sec'y*,
507 Pythian Bldg., Indianapolis, Ind.

ARKANSAS BOARD OF EXAMINERS.

THE next meeting of the Arkansas State Board of Dental Examiners will be held at the Marion Hotel in Little Rock, Ark., on June 8 and 9, 1914.

Application and fees should be filed at least ten days prior to date set for examination.

For further particulars address

I. M. STERNBERG, *Sec'y*,
Merch. Nat'l Bank Bldg., Fort Smith, Ark.

ILLINOIS BOARD OF EXAMINERS.

THE semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the State of Illinois will be held at the Northwestern Dental School, 31 West Lake st., Chicago, Ill., beginning Thursday, June 11, 1914, at 9 A.M. All applications, together with fee, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination.

Address all communications to

O. H. SEIFERT, *Sec'y*,
305-6-7-8 Ridgely Bank Bldg.,
Springfield, Ill.

CALIFORNIA BOARD OF EXAMINERS.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in the city of San Francisco, beginning on June 5, 1914, at 10 A.M. This examination will be followed by one in Los Angeles, beginning on June 17th, at 10 A.M.

Applicants for the examination in San Francisco will file their applications with the board on the morning of June 5th, and for the examination in Los Angeles on the morning of June 17th. Each application must be accompanied by the fee of twenty-five dollars and the necessary credentials—diploma or licenses from other states—together with a recent unmounted photograph of the applicant. For further particulars address

C. A. HERRICK, *Sec'y*,
133 Geary st., San Francisco, Cal.

NORTH CAROLINA BOARD OF EXAMINERS.

THE next regular meeting of the North Carolina State Board of Dental Examiners will be held at Hendersonville, N. C., beginning promptly at 9 A.M. on Monday, June 22, 1914. All applications must be in the hands of the secretary not later than June 15th.

For further information and application blanks address

F. L. HUNT, *Sec'y*,
Asheville, N. C.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Thursday, Friday, and Saturday, June 18, 19, and 20, 1914, to examine applicants for license to practice dentistry. Application blanks, rules, etc., will be forwarded by the Recorder upon request.

By order of the Commission.

EDWARD EBERLE, *Recorder*,
902 Main st., Hartford, Conn.

FLORIDA BOARD OF EXAMINERS.

THE Florida State Board of Dental Examiners will meet June 26, 27, 29, and 30, 1914, in Jacksonville.

All applicants must come prepared to put in one gold and one amalgam filling in the mouth, make one post crown, and set up upper and lower set of teeth on an anatomical articulator. Articulators, models, blowpipes, and gas appliances furnished by the board. Applicants must exhibit diplomas from reputable dental schools. The secretary would like to meet all applicants at the Seminole Hotel at eight o'clock on the evening of June 25th. Fee $25.00.

W. G. MASON, *Sec'y*,
Tampa, Fla.

OHIO STATE DENTAL BOARD.

The Ohio State Dental Board will meet in Columbus, Ohio, on June 16, 1914, to examine applicants to practice in the State of Ohio. Applications must be in the hands of the secretary June 5th.

Holston Bartilson, *Sec'y*,
150 E. Broad st., Columbus, Ohio.

TENNESSEE BOARD OF EXAMINERS.

The Tennessee Board of Dental Examiners will meet in Nashville, June 15 to 19, 1914. Applicants must present diplomas from reputable dental colleges. The examinations will be written and clinical. Operations in operative and mechanical dentistry will be required. A fee of fifteen dollars is charged, and must accompany every application, which must be in writing.

The board will refuse license to anyone making false statements or cheating.

B. D. Brabson, *President*,
R. M. German, *Sec'y*.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners, for examination of applicants for certificate to practice dentistry in the State of Texas, will be held in Dallas, Texas, June 22, 1914, at the High-school building, beginning at 9.00 A.M.

No diplomas recognized; no interchange of licenses with other states. All applications, accompanied by the fee of $25, should be in the hands of the secretary not later than June 17th.

For further information, address

C. M. McCauley, *Sec'y*,
Abilene, Texas.

MISSISSIPPI BOARD OF EXAMINERS.

The Mississippi State Board of Dental Examiners will hold its annual examination June 16, 17, and 18, 1914, at the State Capitol in Jackson.

Applicants will be required to present their diplomas from a reputable dental college or school of dental surgery before entering upon examination; in addition thereto will be required to make not less than 75 per cent. on each subject and all practical work.

Reuel May, *Sec'y*,
Jackson, Miss.

PENNSYLVANIA BOARD OF EXAMINERS.

The next examination of the Pennsylvania Board of Dental Examiners will be held in Musical Fund Hall, Philadelphia, and the College of Pharmacy Building, Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 10, 11, 12, and 13, 1914. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

For further information, address

Alexander H. Reynolds, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee at Marquette University, on June 22, 1914, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations.

Special application blanks for this examination and $10 fee, together with high-school credits, to be filed fifteen days in advance.

F. A. Tate, *President*,
W. T. Hardy, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

MICHIGAN BOARD OF EXAMINERS.

The next meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, commencing Monday, June 15, 1914, and continuing through the 20th. For application blank and full particulars address

F. E. Sharp, *Sec'y*,
Port Huron, Mich.

Annual Registration Required.

Section 5 of Public Act No. 183 of 1913 reads as follows: "Every registered dentist

shall, on or before the 1st day of May of each year, except the one in which he is registered, pay to the secretary of the board of dental examiners a license fee of one dollar. The year for which a fee shall be paid shall begin on the October 1st following the May when it becomes due, and end the succeeding September 30th. In case any person defaults in paying said fee, his license may be revoked by the said board of dental examiners, on thirty days' notice in writing from the secretary, unless within said time said fee is paid."

Notices will be mailed to all dentists registered in the state of Michigan, to their last known address, on or before April 15, 1914. Failure to receive such notice will not be an exemption or an excuse for non-payment. In such cases all persons should notify the secretary, giving their correct address. This also applies to all those living outside the state.

F. E. Sharp, *Sec'y*,
Port Huron, Michigan.

SOUTH DAKOTA BOARD OF EXAMINERS.

The next regular semi-annual meeting of the South Dakota Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, July 7, 1914, at 1.30 P.M. Applications for examination must be made before July 1st. For blanks and further particulars apply to

Aris L. Revell, *Sec'y*,
Lead, S. D.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly Chamber of the State-house, Trenton, N. J., on June 29, 30, and July 1, 1914. License fee, $25. No interchange of license. Applications must be filed *complete* with the secretary at least ten days before date set for examination.

All applicants for a license to practice dentistry in New Jersey—"shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college, he or she had obtained an academic education consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof." Therefore the secretary will issue application blanks to applicants only upon the presentation of the required dental certificate from the superintendent of public instruction, Trenton, N. J.

A bridge, consisting of three or more teeth, exclusive of abutments, and one Richmond crown (gold metal) will be required, mounted and articulated, as a practical test in prosthetic dentistry, in place of a full set of teeth soldered upon a gold or coin silver plate as hitherto required.

For further particulars, apply to

Alphonso Irwin, D.D.S., *Sec'y*,
425 Cooper st., Camden, N. J.

MAINE BOARD OF EXAMINERS.

A meeting of the Maine Board of Dental Examiners will be held at the State-house, Augusta, June 23 and 24, 1914. For further information and applications apply to

I. E. Pendleton, *Sec'y*,
Lewistown, Me.

VERMONT BOARD OF EXAMINERS.

The next meeting of the Vermont Board of Dental Examiners, for the examination of candidates to practice in Vermont, will be held at the State-house, Montpelier, commencing at 2 P.M. on June 29, 1914, and continuing for three days.

To be eligible for examination a candidate must (1) be twenty-one years of age, (2) must be a graduate of a high school of the first class, and (3) must be a graduate of a reputable dental college.

Applications must be in the hands of the secretary not later than June 20th. For further information apply to

George F. Cheney, *Sec'y*,
St. Johnsbury, Vt.

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. Harvey Blain, *Sec'y*,
Prescott, Ariz.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending March 7, 1914:

First Lieut. C. G. Baker has been granted ten days' leave of absence by Par. 4, S. O. No. 50, Headquarters, Eastern department.

For the week ending March 14th:

(No changes.)

For the week ending March 21st:

L. B. Wright, ACT.D.S., ordered to temporary duty at Fort Ontario, N. Y., May 2 to 25, 1914, and at Fort Niagara, N. Y., May 26th to June 30th. Granted ten days' leave of absence on surgeon's certificate of disability.

Charles Taintor, ACT.D.S., directed to remain at Fort Crockett, until April 7th, and then to proceed to Fort Oglethorpe.

First Lieut. R. F. Patterson, leave extended one month and twenty days.

First Lieut. Harold O. Scott, on arrival in the United States, will proceed to the Presidio of Monterey, Cal., and report for duty.

First Lieut. Samuel H. Leslie, on arrival in the United States, will report to the commanding general, Eastern department, for duty.

Emmett P. Varvel, ACT.D.S., relieved from Presidio of Monterey, Cal., effective at such time as will enable him to comply with this order, and will proceed at the proper time to San Francisco, Cal., and take the transport to sail about May 5th, for Honolulu, H. T., for duty.

For the week ending March 28th:

(No changes.)

For the week ending April 4th:

First Lieut. G. H. Casaday granted leave for three months, effective at such time after May 15th as his services can be spared.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH 1914.

March 3.

No. 1,088,962, to FRANK B. BOSTWICK. Aseptic dental waste receiver.

No. 1,089,201, to ALBERT EDWARD FOLLOWS. Artificial tooth.

March 10.

No. 1,090,126, to FRITZ REICHMANN. Toothbrush.

March 24.

No. 1,090,939, to RICHARD HENRY NEWTON. Composition of matter to be used for the manufacture of plates for artificial teeth.

No. 1,091,090, to CHARLES PAUL TACAIL. Apparatus for massaging gums.

No. 1,091,209, to MARSHALL EDISON GATES. Toothbrush.

No. 1,091,291, to CHARLES EDWARD CARROLL. Toothbrush.

No. 1,091,314, to CARL H. ERICKSON. Toothbrush.

No. 1,091,446, to ALEXANDER L. VAN ARSDALL. Removable saddle for fixed dental bridges.

March 31.

No. 1,091,522, to DAVID W. MCLEAN. Moistening device for dental engine handpieces.

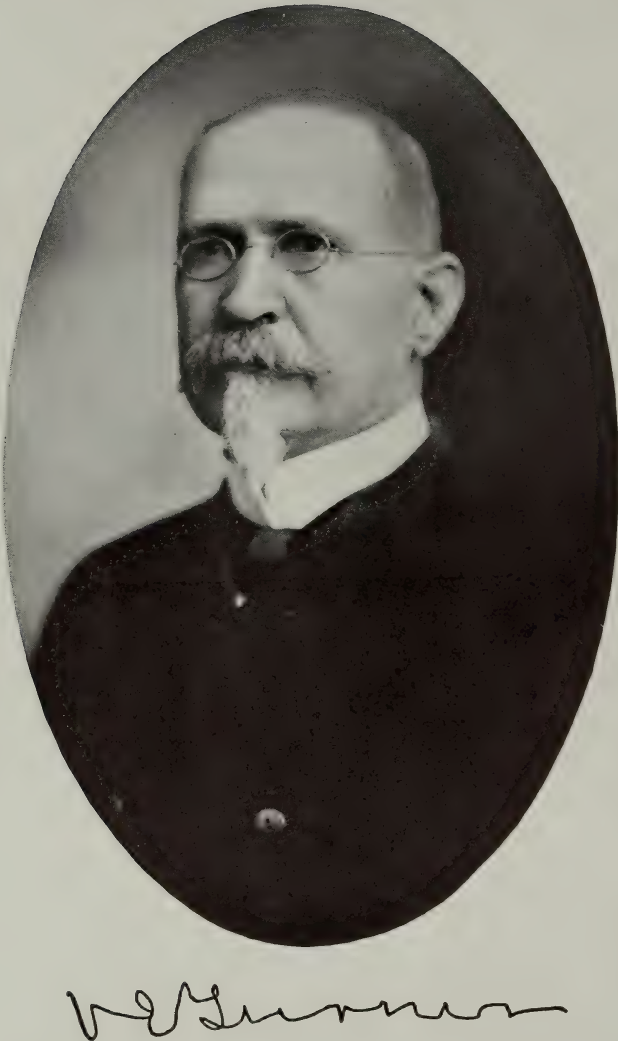
No. 1,091,789, to BIRGER T. ANDREN. Dental instrument.

No. 1,091,852, to JOSEPH LAUTENBURG. Retaining means for sets of teeth.

No. 1,091,973, to WESLEY LINFORD SMITH. Apparatus for administering anesthetics.

No. 1,091,993, to PETER F. WHITE and WALTER GRANT. Toothbrush.

No. 1,092,014, to THOMAS L. BRIGGS. Toothbrush.



THE

DENTAL COSMOS.

VOL. LVI. JUNE 1914. No. 6.

ORIGINAL COMMUNICATIONS.

STUDY OF NORMAL DENTAL ARCHES AND NORMAL OCCLUSION.

By BERNHARD W. WEINBERGER, D.D.S., New York, N. Y.

(Read before the Alumni Society of the Angle School of Orthodontia, New London, Conn., July 30, 1913.)

"THE state of the mouth forms a very distinguishing characteristic. On its formation greatly depends regularity of features and general animation of expression."(1)

Early in the history of medicine, physicians recognized that specialization was essential,(2) that the best and ablest could not obtain sufficient knowledge and skill to practice all its branches, and that those who devoted a part or all of their time to certain fields were most likely to succeed. As men began to pay more attention to the teeth, dentistry came into its own as a profession, and through its development a greater appreciation of the importance of the preservation, development, function, and relation of the teeth to the face has resulted.

THE PROBLEM OF NORMALITY IN OCCLUSION.

Perhaps in life the greatest factor is individuality. Our fellowmen are judged by their faces—more so than by their build or carriage. We orthodontists might be called the masters of individuality, inasmuch as we are daily engaged in attempts to change that portion of the human framework which contributes the most toward the making up of that great factor. Therefore we are in duty bound to respect that field, and to thoroughly understand not only the teeth, their structure, tissue changes, and bone growth, but the adjacent structures, and to appreciate the importance of facial development and of "normality"—for without a knowledge of the normal, how can we treat the abnormal?

What then is the "normal," and what bearing has it on occlusion? In this age no specialist or dentist need be told what normal occlusion of the teeth is, nor the bearing it has on dentistry. It remained, however, for Dr. Edward H. Angle(3) to give his conception of this basic principle, and enable the profession to obtain a clear understanding of what is really meant. According to Dr. Angle, "probably less than three per cent. know

the correct occlusion of the teeth, individually or collectively."(4) As to determining beforehand the shape of the dental arch in harmony with the face, Mr. E. H. Wuerpel agrees with Dr. Angle that "Only one or two in three hundred of even art students succeed in mastering the ability to determine the proper balance of the features of each individual."(5)

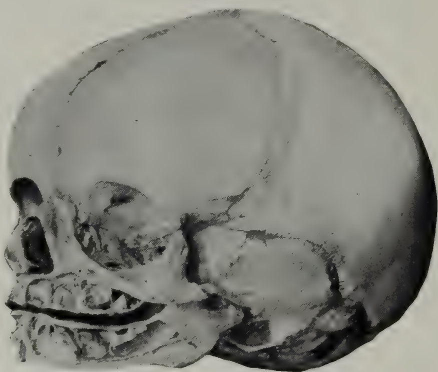
Fig. 1.

Typical normal skull. (Cryer.)

If, then, but three per cent. know the normal occlusion of the teeth, how many have paid attention to the normal arch? How many at the beginning of treatment—yes, even at the end—find themselves asking, "What is the normal dental arch, and what relation has it to normal occlusion? In the treatment of malocclusion we not only have to know occlusion—the law and significance of normal occlusion, the development and fundamentals, but also what the normal arch is, in order to determine finally where abnormally placed teeth must be brought.

Dr. Angle has given us a law for normal occlusion in which he states that "The best balance, the best harmony, the best proportions of the mouth in its relation to the other features, require that there shall be the *full complement of teeth,* and that each tooth shall be made

Fig. 2.



Skull of infant at birth. (Noyes.)

to occupy its *normal position.*"(6) What is this position?

There are some who practice orthodontia who willingly sacrifice sound teeth, making the dental arch in almost every case shorter than normal, and who

Fig. 3.

Showing complete deciduous dentition. (Turner.)

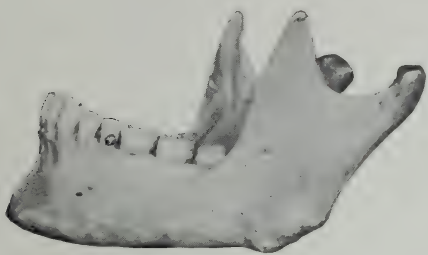
for this reason fail to recognize the abnormal occlusion after the correction of the teeth, and whether the mouth is in harmonious relationship with the other features. Until now, too few have paid close attention to what the normal arch should be, and given sufficient thought to its construction.

In order to understand what we actually find in examining a series of normal arches, it will be advisable to give a brief description of the upper and lower jaws and their relation to each other, the relation of the teeth to the face, and the normal variations of the forms of the head.

Fig. 4.

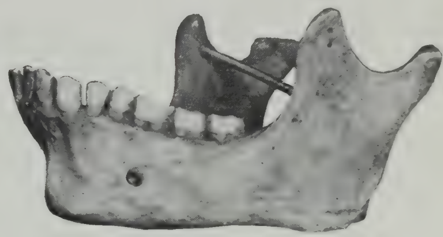
At about twenty years. Well advanced in years. (Cryer.)

Fig. 5.



Typical Caucasian.
(For skull see Fig. 29, A.)

Fig. 6.



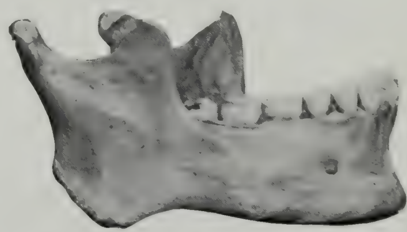
South African negro. (Cryer.)
(For skull see Fig. 29, D.)

THE MAXILLA.

The maxilla includes the right and left maxillæ, the teeth and the alveolar process, and in addition, all other facial bones with the exception of the mandible and part of the ethmoid and sphenoid bones of the cranium. As to the form and arrangement of the teeth, Black(7) says:

The upper teeth are arranged in the form of a semi-ellipse, the long axis passing between the central incisors. In this curve, the cuspids stand a little prominent, giving a fullness to the corners of the mouth. In different persons, there is much variation of the form of the arch, within the limits of the normal. Occasionally the bicuspids and molars are a little outside the line of the ellipse. In the examination of the most perfect dentures, it is found that the two sides do not perfectly correspond, and that certain teeth deviate from the perfect line. The incisors are arranged with their cutting edges forming a continuous

Fig. 7.



(For skull see Fig. 29, b.) (Cryer.)

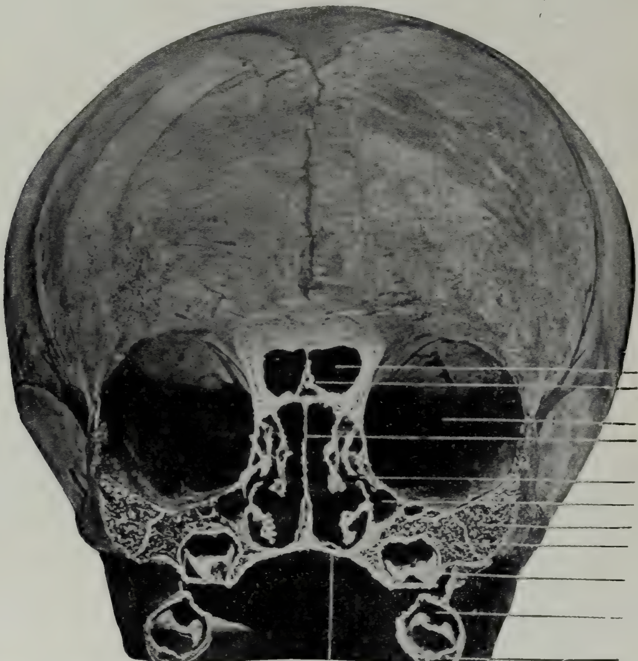
curved line from cuspid to cuspid, and this line is continued over the cusps of the cuspids and the buccal cusps of the bicuspids and molars to the distal surfaces of the third molars. From the first bicuspid to the third molar, the lingual cusps of these teeth form a second line of elevations. Between these two, the lingual and buccal cusps, there is a continuous, but irregular, valley or sulcus.

Fig. 1 is an illustration from a typical normal skull. The general shape, size, and position of this maxilla stand in definite relationship with the skull. (See Fig. 29, A.)

MANDIBLE.

The mandible is made up of the body and the ramus, the teeth, and the alveolar process. The teeth and the alveolar process are placed on the upper portion of the body of the bone. At the upper and posterior end of the ramus is the condyloid process, which articulates with the glenoid fossa of the temporal bone. The angle of the mandible at birth is very obtuse (see Fig. 2). As the bone increases in size the alveolar process develops, and the permanent teeth take the place of the deciduous ones; the mandible, being forced apart from the maxilla, causes this angle to lose its marked obtuseness (see Fig. 3), forming almost a right angle in adult life. As the teeth wear away, or when they are extracted, the alveolar process is resorbed, the horizontal planes of the jaws approach each other more closely, and the angle again becomes obtuse. (See Fig. 4.) When the jaws can be kept apart with the full complement of teeth and allowed to perform their duties, no such changes occur in the angle. Fig. 5 is an illustration of a mandible of a typical Caucasian skull about twenty-five years of age. The mental process gives prominence to the chin and lower part of the face. The teeth are set back, the third molar extending beyond the ramus, the angle being 125°. The incisors are normal in inclination. Fig. 6 is taken from a man-

FIG. 8.



Skull of a fully developed embryo cut vertically through the first deciduous molars, the orbit, and nasal chambers. (Cryer.)

dible of a South African negro. The body of the mandible is fairly typical, except that the angle is nearer a right angle, viz, 118°. The mental process is not as prominent as in Fig. 5, owing partly to the carrying forward of the teeth and the alveolar process. The prognathous features are caused by the teriorly about midway between the lower border of the jaw and the top of the alveolar process and between the roots of the first and second premolars. In Fig. 6 the mental foramen is under the first molar instead of being on a line between the roots of the premolar as instanced above.

FIG. 9.

Skull in normal occlusion. (Turner.)

position of the teeth and the alveolar process. The position of the molars is noteworthy, there being room for another molar, behind the third. The mental foramen will be found below the first molar, showing that in skulls like those of the Fan tribe, the teeth are carried forward by the width of a molar. (See Fig. 7.) In this skull the mental process lies almost directly below the teeth and is in direct contrast with the two preceding figures. The third molars are found almost hidden behind the anterior border of the ramus, the angle being almost a right angle, viz, 103°. In Figs. 5 and 7 we find the mental foramen to be rather a fixed point antero-pos-

THE RELATION OF THE TWO JAWS.

The lower jaw is developed slightly in advance of the upper, as shown in Fig. 8; for if a vertical line is drawn through the centers of the tooth germ and the alveolar process of each jaw, it will be found that the line of the upper jaw is on the inner side of those of the lower, the difference being one-half the thickness of the lower jaw, but as the teeth erupt, the lower acts as a matrix upon which the upper jaw is formed, and we find the upper teeth one-half a tooth buccally over those of the lower. On examining Fig. 11, if a line is drawn through the axis of the upper and lower

teeth, it will be found that those of the upper teeth are on the outer side of the lower jaw.(9)

Normally, each tooth of the upper jaw occludes with two in the opposite jaw with the exception of the upper third molar. In occlusion the upper teeth project a little labially and buccally to the lower at all points of the arch. (See Fig. 9.) The incisors and canines occlude so that the incisal edges of the lower incisors and canines come in contact with the lingual surfaces of the corresponding teeth of the upper jaw near the incisal edges. "The mesiobuccal cusp of the upper first molar is received in the buccal groove of the lower first molar. The teeth posterior to the first molars engage with their antagonists in a precisely similar way; those anterior interlock with one another in the interspaces, until the incisors are reached; of these the upper teeth usually overhang the lowers about one-third the length of the crowns. The length of the overbite of the anterior teeth is the same as the length of the cusps of the molars, premolars, and canine. Fig. 10 shows the linguo-occlusal relations, except that the lingual cusps of the lower buccal teeth project beyond those of the upper into the oral cavity. In the transverse arrangement, the buccal cusp of the lower molar and premolar occlude with the buccal cusps of the upper, and the lingual cusps of the upper; and the lingual cusps of the upper molars and premolars occlude with the buccal and lingual of the lowers.(10) (See Fig. 11.)

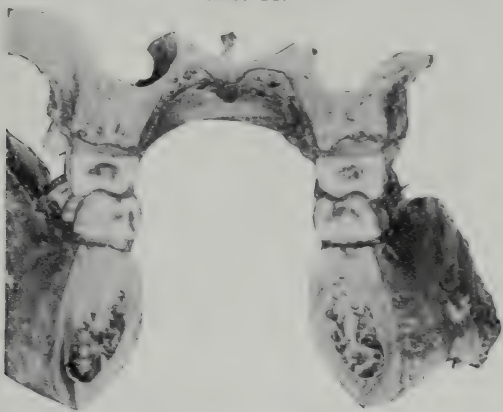
FIG. 10.

Normal occlusion: lingual relation. (Turner.)

In a careful study of the above occlusion one must not lose sight of a number of important factors. The occluding contact points must not be considered as surfaces or cusps, but planes; and while the occlusion of the centrals and laterals is a simple arrangement, that of the canines, premolars, and molars is more complicated. In the case of the canine, in place of one cusp we find four inclined planes, while the premolars occlude at eight instead of merely two points. On the other hand, each of the molars presents sixteen inclined planes, and not four cusps or points. The four

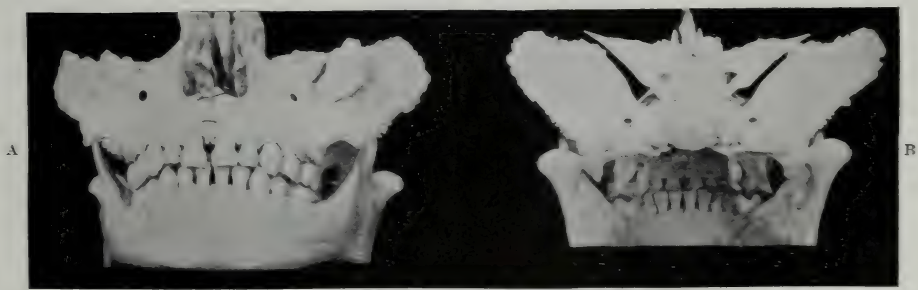
inclined planes of each cusp, in turn, occlude with four of the inclined planes of four different cusps. Thus, "The distal incline of the second upper premolar occludes with the mesial incline of the mesio-buccal cusp of the lower first molar. The mesial incline of the mesio-buccal cusp of the upper first molar occludes with the distal incline of the mesio-buccal cusp of the lower first molar; the distal incline of the mesio-buccal cusp of the upper first mo-

Fig. 11.



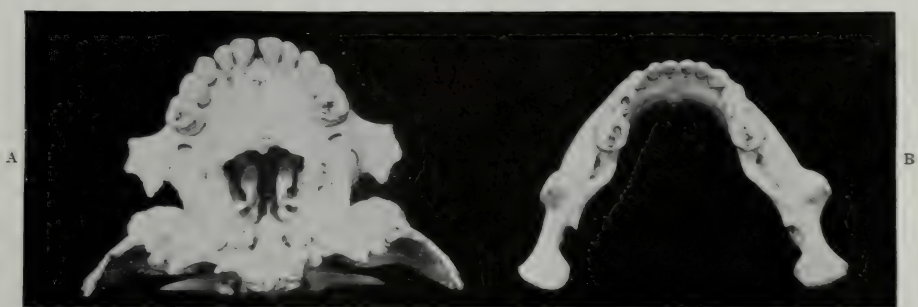
Normal occlusion of molars: transverse section. (Cryer.)

Fig. 12.



Normal occlusion of child of five years. (F. C. Brush.)

Fig. 13.



Occlusal surfaces, maxilla and mandible. (F. C. Brush.)

lar occludes with the mesial incline of the disto-buccal cusp of the lower first molar; the mesial incline of the disto-buccal cusp of the upper first molar occludes with the distal incline of the disto-buccal cusp of the lower first molar, and the distal incline of the disto-buccal cusp of the upper first molar occludes with the mesial incline of the mesio-buccal cusp of the lower second molar." ([illegible]) The same order is continued with the buccal cusp of the other molars. Thus the proper locking of each cusp and inclined plane is assured, preventing the

FIG. 14.

a b c d e f

a. Swiss (Basle) .... Index 64
b. Norwegian (Aamot) .... " 75
c. German (Baden) .... " 83
d. Hungarian (Thorda) .... " 88.5
e. Lapp (Scandinavian) .... " 94
f. French (Savoy) .... " 96

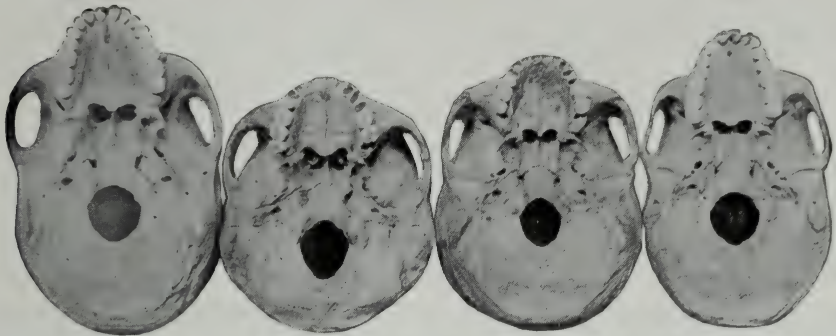
Illustrating relation existing between facial form and the proportions of the head measured by cephalic index.

teeth from sliding out of their proper position. By this arrangement, nature has taken care to assure the retention of corresponding teeth through loss by extraction or otherwise, and thus prevent rotation of the teeth and the collapse of the entire arch.

Fig. 12 represents a skull of a child about five years of age, and shows this general arrangement exactly. Every tooth has its normal position, but we must not forget that this position changes from day to day, as both the tooth germs and the teeth, as well as the general

shape of the mandible and maxilla, change in position and shape from the time when they are developing until they are lost. Fig. 12, A, shows the front view of the maxilla and mandible. It is noteworthy how the uppers overlap the lowers by about one-third of the labial surfaces. Fig. 12, B, not only

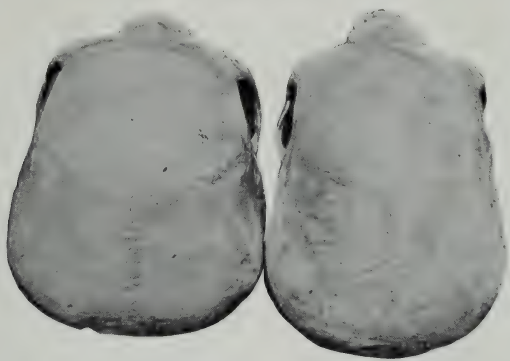
Fig. 15.



Negro. Mex. Indian. Thibetan. Australian. (Osburn.)

shows this from the lingual aspect, but also the transverse occlusion. The spacing between the teeth is normal. Fig. 13, A and B, shows the occlusal surfaces of both the maxilla and mandible. On the occlusal surfaces the position of the

Fig. 16.



Thibetan. Australian. (Osburn.)

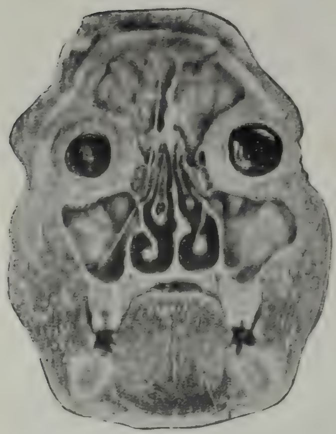
first molars in their crypts, about to erupt, may be noted.

Before taking up the normal variation of the forms of the head, special attention should be paid to the horizontal plane of the teeth in the dental arch. This plane extends from the mesial angle of the upper central incisor to the distobuccal cusp of the first molar.

NORMAL VARIATION OF THE FORMS OF THE HEAD: CEPHALIC INDEX.

Faces are similarly formed, yet every face by certain features is stamped with individuality. For the sake of simplicity we divide the face into three sections—upper, middle, and lower. The first section lies between the normal hair line and the roof of the orbit. the second extending from the roof of the orbit to the base of the nose, and the third being situated between the base of the nose and the mental process. The first two are unchangeable areas, while the lower section may be termed changeable. This area may be divided into four segments, as follows: "Segment 1: From the base

FIG. 17.



(Cryer.)

FIG. 18.

(Cryer.)

FIG. 19.

(First three models belong to Dr. Milo Hellman.)

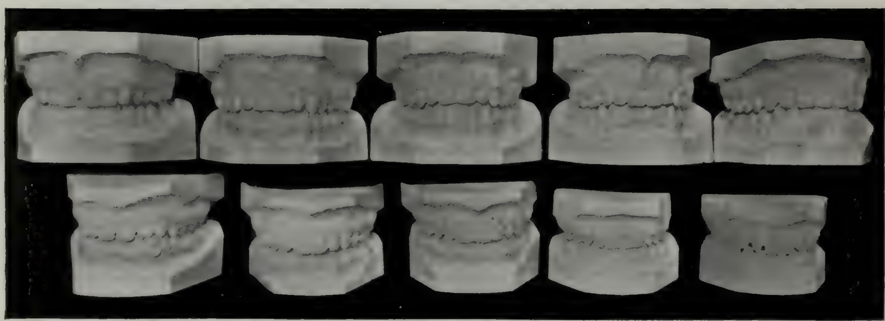
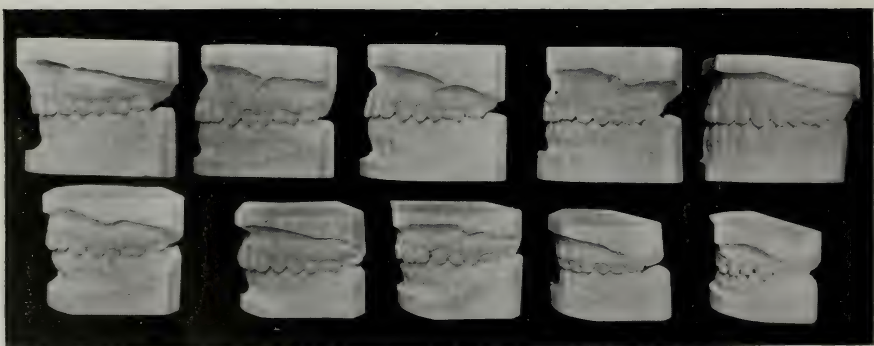


FIG. 20.



FIGS. 19 to 22: Models of normal occlusion, showing variations in the inclination of the teeth and the relation of the upper and lower arches.

of the nose to the upper portion of the upper lip. Segment 2: The lower portion of the upper lip. Segment 3: The lower lip. Segment 4: The chin."(11)

In the ideal Greek type these thirds are of equal length, but they are seldom found so in the average face. By observing these thirds, we are able to determine

whether the face is "in harmony and balance." As to the profile, we find it assuming one of three characteristics—straight, convex, or concave. In the normal standard of the convex profile we find the face rounded and graceful, with a high forehead that recedes slightly, a Greek or Roman nose, full lips, with the chin receding, but strong. The teeth are normal as to number and alinement. The second, or straight profile, is the Greek Apollo face, while the concave profile is rare.

For years anthropologists have recognized a variation in the human cranium, and have adopted means to record this variance. There are those who take into consideration only the distance from the foramen magnum to the top of the nose, others measure the skull as a whole from the foramen magnum to the mental process. "Therefore the head is, for all purposes, best measured by what is technically known as the cephalic index. This is simply the breadth of the head above the ears expressed in percentage of its length from the forehead to back. Assuming that this breadth is 100, the width is expressed in a fraction of it. As the head becomes proportionately broader—that is, more fully rounded when viewed from the top down—this cephalic index increases. When it rises above 80, the head is called brachycephalic; when it falls below 75, the term dolichocephalic is applied to it. Indices between 75 and 80 are characterized as mesocephalic." (12) "The cephalic index may run as low as 62, and it has been observed as high as 103. A factor which is of great importance in the identification of types is the correlation between the proportions of the head and the form of the face. In the majority of cases, a relatively broad head is accompanied by a rounded face, in which the breadth back of the cheek bone is considerable as compared with the

FIG 21.

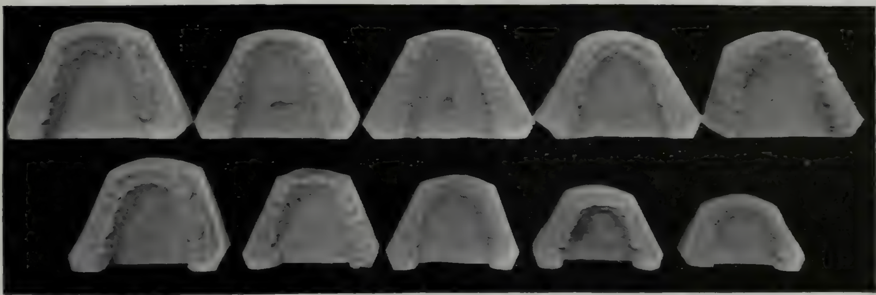
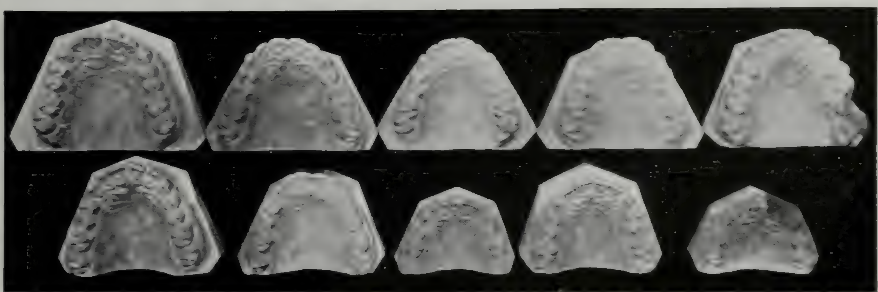
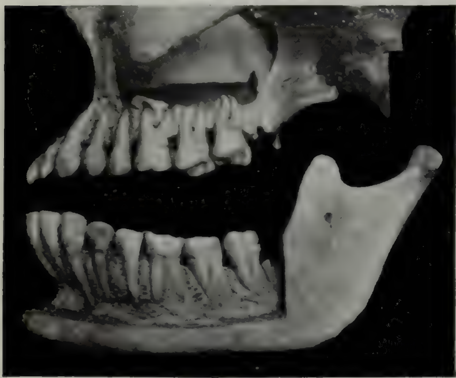


FIG. 22.



height from the forehead to the chin. Therefore a long head, an oval face; a short head, a round face. In proportion

Fig. 23.



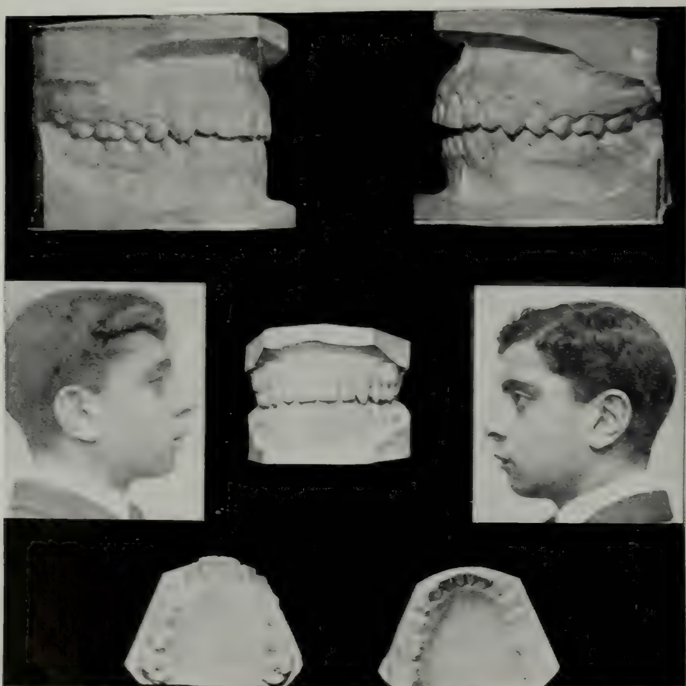
Showing inclination of roots.
(Hopewell-Smith.)

as the heads become broader back of the temples, the faces appear relatively shorter."(12) A rounded face due to full cheeks should be carefully distinguished from one in which the breadth is due either to prominence of the cheek bones or to the real breadth of the head itself.

Fig. 14 illustrates the relation existing between the forms of the face and the proportions of the head measured by the cephalic index, and gives us a clear idea as to the great variances in human heads, from the long oval-faced individual with the cephalic index of 64 to that of the full-face (in *f*) with an index of 96.

That there is a definite relation in the proportions of the dental arches and the skull, Prof. Raymond C. Osburn has shown us. (See Fig. 15.) In the Australian skull, which is most dolichocephalic, is seen the longest and narrowest dental arch. In the negro, which is about half as long, the arch is shorter and rounder. The Thibetan is moderately brachycephalic, and the arch is rounded.

Fig. 24.



(Dr. F. C. Brush's.)

In Fig. 16, which shows a top view of the Australian and Thibetan skulls, the general conditions of the long and short head are shown, also the definite correlation between the length of the skull and the form of the head. (13)

Fig. 25.

Fig. 26.

(Coeberg.)

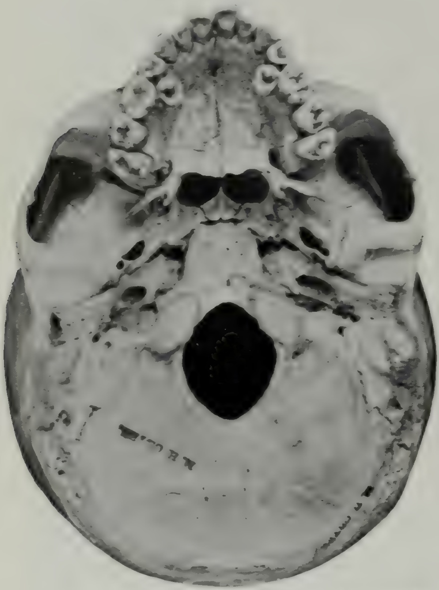
As of lower animals, so is it true of the human race, that "The teeth conform to the skull, rather than the skull to the teeth."

When we further consider some of the anatomical variations of the face with reference to the type of the head, a peculiar and important relationship of the internal structures will be found.

Individuals, such as the Swiss type (*a* in Fig. 14) may be said to lack nasal and maxillary development in comparison with those of the brachycephalic or French type. By comparing Figs. 17 and 18, two cross sections of skulls, we recognize, by the width of the skull as compared with the length in Fig. 17, a typical dolichocephalic type, the skull

appearing to be internally compressed. while in Fig. 18 we note the small, narrow nasal fossæ, deflected septum, and narrow vault and arch. It is in these types that we are apt to find a lack of development and consequently malocclusion. However, the point I wish to emphasize is the great difference existing in the thickness of the maxilla, which we must consider in the study of the normal arches.

Fig. 27.



(Cryer.)

CONSIDERATION OF FACIAL AND DENTAL CHARACTERISTICS IN ORTHODONTIC TREATMENT.

By studying the general characteristics found in normal arches in conjunction with normal skulls we can obtain a comprehensive idea of their demands. Figs. 19 to 22 show the front, side, and the occlusal surfaces of a number of normal occlusions. From these illustrations it is easy to see that, in the case of normal upper and lower arches in normal occlusion, both upper and lower arches present the same relative form as the six anterior teeth, in a section of a semi-ellipse, while from the distal half of the canines to the molars the remaining teeth are in either a direct straight or slightly curved line, this line continuing to the first molar at least. In the deciduous set of teeth, this anterior curve is greater than in the permanent set; in fact, the ten teeth may be described as falling within half of a circle. (See Fig. 13.) Both halves of the arch may be said to be symmetrical. The direction of the permanent teeth in the upper is vertically downward and slightly labially, while that of the lower is vertically upward, the molars tending slightly lingually. The crowns are inclined more or less forward, or toward the lip or cheek, and slightly toward the median

Fig. 28.

(Cryer.)

line. The roots take the form of the alveolar process and are inclined distally and lingually. This is beautifully shown in Fig. 23 and Fig. 30.

Another important factor easily lost sight of, and clearly shown in the last illustration, is this slight distal inclination of the long axis of the anterior teeth; and care should be taken in the treatment not to disturb this inclination, especially in the use of the new Angle appliance. Many failures in retention can be traced to the upright movement of these teeth, which causes spacings between the centrals, laterals, cuspids, and molars, and through these disturbs occlusion.

As to the theories that the form and relations of the jaw and teeth constitute definite triangles, and that the abnormally formed dental arch can be reconstructed mathematically;—in embracing

such ideas we lose sight of the fact that there does not exist one form alone of dental arch, but four, and that temperament is a very important factor in the construction of these arches.

The profiles and front views show that the faces are in harmony and balance. The lips are full and prominent, but do not fall together in a straight line. From the artist's standpoint this is a disappointment.

We find, however, that in Fig. 24 we have an exception. Upon examining this face we find that, though the arches and occlusion are normal, the profile lacks both harmony and balance, and resembles closely the typical class II case.

Fig. 25 shows a child of four years of age, with a normal deciduous denture, regular spacing between the teeth, and general roundness of the arch. Were this spacing present in every deciduous arch, orthodontia would be unknown.

In Fig. 26, in which the profiles of ten other normal occlusions are shown together, the position of the upper and lower lips can be observed. [Other illustrations from Dr. Coeberg were exhibited by the writer, showing the occlusal surfaces of the above cases.] Although the occlusion and the arches are what might be termed normal, in most an overlapping of the anterior teeth, especially the lower ones, is found.

Before concluding, I wish to show another of Dr. Cryer's skulls (Fig. 27) in contrast with those with normal arches and occlusion. Were it not for the presence of two of the bicuspids within the arch, the arch might appear normal.

FIG. 29.

A B C D

(Cryer.)

Although the occlusion of the molar series is normal, Fig. 28 tells a very important story, at the same time illustrating the results of extraction of these teeth in order to correct malocclusion. Lack of anterior occlusion, an open bite, and the great obtuseness of the angle of the mandible is the result.

In contrast with the above, the series of skulls with normal occlusion shown in Fig. 29 should convey an impressive lesson.

CONCLUSION.

In conclusion, let me sum up briefly as follows:

Under normal conditions of growth, a definite relationship exists between the size of the teeth and the jaws, allowing for variation in the length due to the correlation existing between the head and the length of the jaw. The greatest variation is in the width of the ascending ramus.

The deviation from normal is connected, as a rule, rather with the alveolar process and the teeth than with the entire mandible.

No prearranged diagrams or forms can be of use to us, in that we must observe the correlation which exists between the form and position of the teeth, the form and position of the dental arch, and the cranial type.

The normal arrangement in the jaws is the result of normal growth of the bone. Normal denture lines accompany normal facial lines, and abnormal arches must give a certain degree of abnormality to the lines of the face.

We must study the relation of the normal arches and features in models taken from living individuals as well as in skulls and their measurements, in order to obtain results.

More attention must be paid to the difference of the four forms of the dental arch and the difference in types.

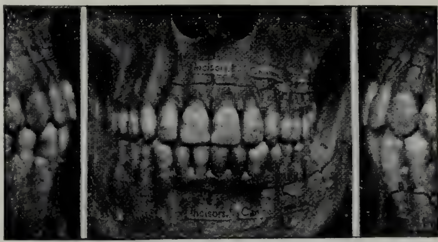
Although a tooth has a normal position, this position changes from day to day, and in the same relative proportions the normal occlusion is influenced.

In the examination of models of normal arches, it is found that the two sides are not symmetrical, and that certain teeth deviate from perfect regularity.

"To establish normal arches and occlusion and retain the teeth in their normal position, to maintain the balance and harmony that must exist, the full complement of the teeth is necessary."

The orthodontist should always remember that there is a definite correlation between normal arches and occlusion, and bear in mind the design of nature (see Fig. 30), viz, beautiful occlusion, graceful lines, and magnificent architecture.

FIG. 30.



(Skull from British Museum.)

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NOTES ON PORCELAIN WORK, WITH SPECIAL REFERENCE TO RETENTION.

By J. J. MOFFITT, D.D.S., Harrisburg, Pa.

(Read before the union meeting of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at Elmira, November 20, 1913.)

WE meet at such conventions as this in the interest of our chosen profession, to learn not only how best to practice it for our own benefit, but also how we may practice it for the greatest benefit of those who intrust their teeth to our care. We know better than the public the value of the teeth and the misfortunes to which they are liable through neglect, because we see so many sad results of inattention to the dental structures, which each one of the public, generally speaking, must experience before he is willing to inconvenience himself to any great extent for preventive treatment. We must, however, not become impatient with the public for not understanding all at once what prophylactic treatment would do for them, but, while doing all we can to instruct them, we must also give considerable attention, at least for a few centuries more, to the art of repairing the destruction which their neglect inevitably causes.

CONSIDERATION OF THE UNPOPULARITY OF PORCELAIN INLAYS.

It has always been unaccountable to me why porcelain work has not been more universally employed in the general practice of dentistry. The satisfaction to the better class of patients which the appearance of a porcelain restoration gives, and the preservative value of the inlaid filling, should secure for it a foremost place of usefulness in our work: but there seem to be other conditions detrimental to its use which prevent its general adoption and compel it to retain the nature of a specialty. I think that probably the fact that these fillings become dislodged, if they are not properly anchored and in proper articulating relationship, has a great deal to do with their unpopularity with the profession. About the most slurring criticism that can be made of a dentist is that the fillings he inserts drop out; and when they come out whole and at some inopportune time, the reflection on the operator is most condemnatory, for that is the way our patients have been trained to view dental operations. On the other hand, if the filling were of amalgam or gold anchored securely, and if the articulation were not just as it should be or should become changed after a few years of masticatory service, the filling would not come out, but might be distorted or driven away from one side or the other of the cavity wall, or a little of the enamel be chipped out beside it; but the filling, not being dislodged, would cast no reflection on the operator, though it would probably permit the ingress of bacteria that would subsequently damage quite a section of the tooth before being discovered. The practitioner, aware of the public's attitude toward or rather ignorance of these possibilities, feels sure that the metallic filling is going to stay in place longer than the inlaid one, and refuses to take the risk. But if, instead of trying to keep the fillings in place by means of anchorages, we would try to find and overcome the causes of their dislodgment, we should be treating the matter in a truly scientific way. I am not trying to compare the two methods of filling teeth, as I am aware that either —well done—is of sufficient value to the

patient, but I wish to call attention to the fact that the operator who makes use of inlaid fillings must give considerable attention to the general occlusion, which, once established as a habit, is of inestimable value to his patients, and to show that a great many restorations which would be tedious and difficult to accomplish by malleted gold fillings can be restored with porcelain with no loss of credit to the operator.

FIG. 1.

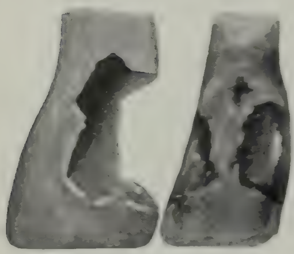


FIG. 2.

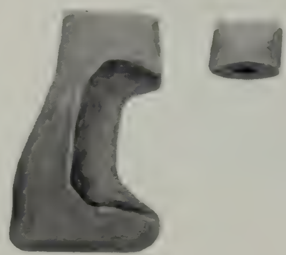
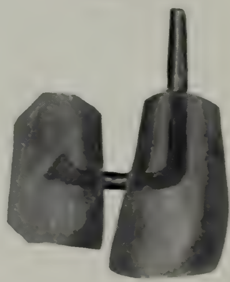


FIG. 3.



EXAMPLE OF THE POSSIBILITIES OF ARTISTIC PORCELAIN RESTORATIONS.

In developing a knowledge of the methods employed and acquiring efficiency in the manipulation of porcelain, the operator would be enabled to render service to his patients such as is otherwise impossible. For instance, a patient was sent to me who had serious trouble with his upper right central and lateral incisors. He was suffering excruciating pain. The lateral was quite loose from pyorrheal conditions, and the central was affected by deeply penetrating caries. (See Fig. 1.) Both caused much severe pain which it seemed impossible to relieve. The patient did not wish the teeth extracted, and wanted them fixed up so that they would look like his other teeth, and was sent to me. I think, so that I also should say that, in order to give relief, the teeth would have to be extracted. I found a small part of the apical portion of the pulp in the central incisor to be vital, and considerable pressure from a dressing in the tooth causing a good deal of pain, which was aggravated by the inflammation due to deposits in the pockets around the lateral incisor. Having removed the remaining pulp and treated the lateral incisor root, I inserted a temporary filling, and allowed the patient to go until the inflammatory condition had subsided—these treatments, of course, have no direct bearing upon the subject under consideration. When conditions were satisfactory, I cut off the natural crown of the lateral incisor (see Fig. 2) which was quite frail and unsightly, and making a porcelain crown with an extended

FIG. 4.

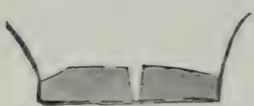


FIG. 5.

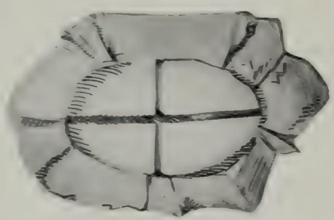
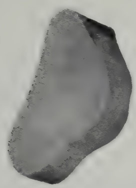


FIG. 6.

pin projecting into the cavity in the central, I baked a porcelain inlay on this pin, which fitted into the central incisor (see Fig. 3), thus strengthening its hollow shell with the compressed cement beneath the inlay, and supporting the lateral tooth in position. The central

FIG. 7.

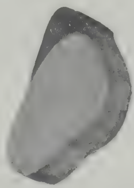


had been temporarily filled with white gutta-percha, which had shown very conspicuously in the patient's mouth, for he had been addicted to the use of tobacco and his teeth were very much stained. But he seemed to have a peculiar pride in having them uniform in their ugliness, so I imitated the colors

FIG. 8.

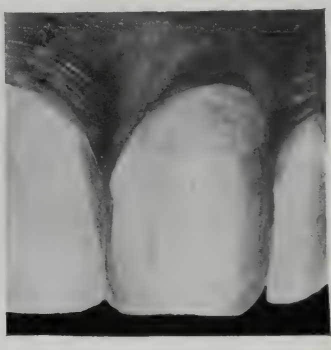
of the adjoining teeth in these porcelain restorations, and sent him back to his dentist to have his other work completed. This piece of work has lasted about five years, and has pleased the patient very much. One day shortly after the operation his dentist, happening to be in town, paid me a visit, during which he said in a confidential way that "It was lucky that that iron rust, or whatever it was, got on the porcelain when it was baking, as it made it match up so well with the other teeth." I mention this to show that familiarity with the use of porcelain enables the operator to do many artistic operations otherwise impossible.

FIG. 9.



There is no more to say about the painting or coloring of the porcelain than there is about the carving and baking of it. It takes a certain kind of natural skill that is always to be found in the hands of every good dentist, and a lot of good hard practice to develop it. Three years in a dental school teach a

FIG. 10.



student to take fairly good plaster impressions of the mouth—when luck is with him; the rules and rudiments of articulating the teeth; how to condense gold foil or fiber so that it will not come out under the hands of the too persistent examiner, and a good deal of valuable abstract knowledge which no operator can do without, but when it comes to

porcelain work—*if one is started right*—it is simply practice, and plenty of it, that will make perfect.

METHOD OF MAKING LABIAL INLAY IN ANTERIOR TOOTH.

The simplest form of a porcelain inlay is a labial one in an anterior tooth. This is made directly in the cavity and without investing by burnishing the platinum foil to the bottom of the cavity, baking a button of foundation porcelain in the bottom of this, leaving room (see Fig. 4) for a small square-end burnisher around the button, so that, on returning it to the cavity, the margins may be completed (see Fig. 6) and the filling finished, usually in two more bakings, with a lower-fusing porcelain. The first addition of porcelain is cut across with a nerve bristle (see Fig. 5) before baking, to permit the porcelain to cling to the matrix, the second filling-in the shrinkage clefts and the third one, when necessary, completing the contour.

FIG. 11.

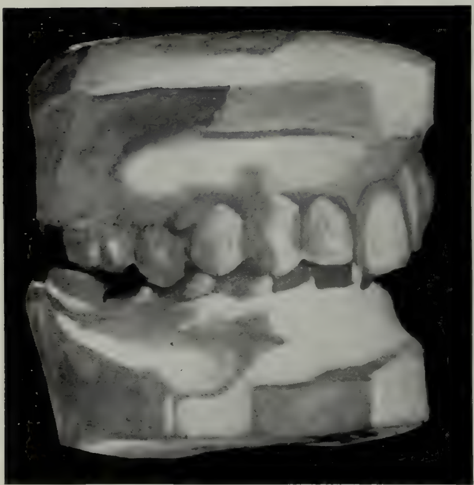


FIG. 12.

PROCURING ANCHORAGE.

The factors in procuring the best anchorage are perfect adaptation of the filling, preventing too much glaze on the high-fusing bottom of the filling so that no acid or wheel will have to touch it, properly mixing and applying the cement, keeping the patient still until a sample of the same mix of cement is hard, and, last but not least, obtaining at the outset the best shape of cavity. This last factor is accomplished with the use of nitrous oxid and oxygen when the teeth are too sensitive for the full amount of necessary preparation. If the patient is one who takes the gas well, the entire work may be done under the anesthetic; if not, the margins should be prepared until satisfactory to the operator, then the gas administered, and the bottom squared quickly with a new square-end fissure bur. One or two minutes of anesthesia will be sufficient for this operation. In some cases, where nasal obstruction or fear of the gas prevents its use, the high-pressure syringe is invaluable. The nearer a cylindroid shape (see Fig. 7) can be given to these simple cavities, the better the retention will be. The cement must be thin enough to permit perfect seating of the filling, and sufficiently thick to set in from twenty to thirty minutes. When these cavities extend above the gingival line (see Fig. 8) the filling should be painted with pink china paint (Fig. 9) to keep the length of the labial surface of the tooth in harmony with that of the approximating teeth (see Fig. 10).

BUILDING-UP INCISAL CORNERS.

I have described a method for making a porcelain inlay where access for burnishing the matrix cannot be obtained, in the *Dental Brief* for April 1913.

FIG. 13.

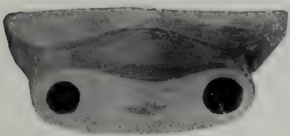
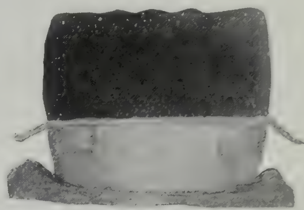


FIG. 14.

FIG. 15.



Front teeth with the incisal corners broken off, or about to break off from ingress of caries, require porcelain fillings, for, when excavation can be completed without removing the corner, the cement under the filling will strengthen that corner, and when the corner is lost, porcelain is the only acceptable material to patients of a certain class. Lost corners are usually due to neglect, or caries beneath previous fillings, in combination with disarranged occlusion caused by the loss of one or more posterior teeth. If the trouble is chiefly due to micro-organisms penetrating the tubuli of the tooth, they must be destroyed, and if the tooth is being cracked by faulty occlusion, these conditions must be corrected before a porcelain filling should be attempted. If we find our porcelain contour restorations of the anterior teeth beginning to strike the lower teeth and we grind them down until they do not touch, as soon as the remaining teeth wear down a little more or the molars tilt over a little farther and allow the porcelain to strike first, it is certain that these restorations become dislodged again; but if we correct the occlusion and prevent the porcelain edges from undue stress, and if we destroy the micro-organisms that are in the tubuli of the teeth, then so shape the filling that its anchorage by cement is most augmented, and manipulate our cement so that its utmost efficiency is obtained, we are able to secure more permanent results by this method of restoring the anterior teeth than by going about it with no formulated plan of procedure.

FIG. 16.

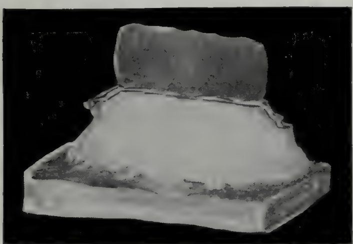
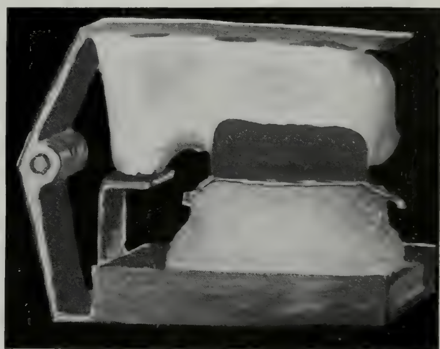


FIG. 17.



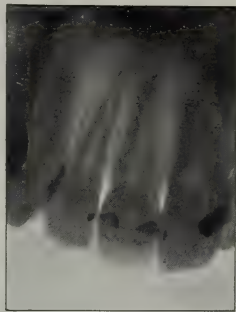
FOUR FACTORS AIDING RETENTION.

The four points as aids in retention which it is well for the porcelain worker

to keep in mind are: (*a*) Correction of the occlusion; (*b*) sterilization of the dentin; (*c*) shaping of the cavity, and (*d*) manipulation of the cement.

FIG. 18.

A



B

Correction of the occlusion. Where one or more posterior teeth have been missing for any length of time, and the interlocking system of the cusps has become disarranged, besides not giving the patient the full efficiency anatomically and physiologically for which they were designed, they present difficulties to the porcelain worker, chiefly in regard to the direction of the forces to which his work is subjected during mastication. Fig. 11 shows a case sent to me because it was impossible to retain porcelain inlays in the anterior teeth. The patient would not have gold fillings, so his teeth were filled with a silicate cement, which, on account of the large extent of the cavities occlusally and because these fillings had broken away several times, had been rounded down at the mesio- and disto-incisal angles, giving a very unsatisfactory appearance. The lower anterior teeth struck the upper ones all the way up the lingual surface, coming to rest just where a good base was necessary for porcelain fillings—so that food between them pressed in a labial direction, and the posterior teeth struck their antagonists cusp against cusp, so that food particles during mastication would tend to tilt the fillings outward instead of directing the pressure against

FIG. 19.

the slopes of the approximal planes of occlusion. Fig. 12 shows the articulation corrected as far as practicable in a patient of thirty-eight or forty years of

age, and the desired results accomplished as to permanent retention of the porcelain, besides giving anatomically a better facial contour and physiologically greater efficiency of the organs of mastication.

Sterilization of the dentin. In the sterilization of the dentinal tubules, we find a use for the now almost discarded creasote. It will, under pressure with gutta-percha properly applied in a previously dried cavity, destroy the micro-organisms that may have penetrated beyond the visible extent of caries or possible extent of excavation, so that in twenty-four hours' time no culture can be obtained from cuttings from the bottom of the cavity, though with the microscope innumerable dead micro-organisms are seen in the same cuttings. This sterilization is to prevent the recurrence of caries or the ingress of the micro-organisms into the pulp and its destruction beneath the filling—a process of infection often ascribed to too much metal in a tooth, thermal shock, pressure, etc.

Shaping of the cavity. In shaping the filling for retention, the nearer its interior portion comes to the cylindrical or cylindroid form, the better will be the retention. The base will then be square, and in compound fillings a cross section will show a part of it surrounded by dentin, as will be illustrated later.

Manipulation of the cement. In the manipulation of the cement, its flow or the facility with which it can be squeezed out from beneath the filling, and the length of time it requires for complete setting, must be known to the operator. He must remember that the larger and flatter the base of the filling, the thinner the cement must be to permit pressing the filling to place. In some patients the rubber dam must be employed to secure dryness for a sufficient length of time. I have an assistant mix the cement and apply it to the filling, while I dry the cavity and apply the cement to it. Adhesion of the cement to the cavity walls is best obtained by washing the cavity with alcohol to remove medicaments, followed by chloroform to remove all traces of gutta-percha, etc. Adhesion of the cement to the porcelain is best obtained by not glazing the inner part of the filling, using a lower-fusing porcelain to obtain the final glaze, as before mentioned, so that a wheel never need touch it to leave dust in its porous surface. Then the platinum is removed just before the cement is used, trying the filling in the prepared and dried cavity so that the porcelain may not be touched by saliva, but come clean and pure from the furnace.

Fig. 20.

Fig. 21.

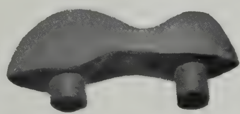
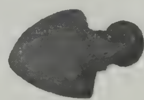


Fig. 22.



PORCELAIN PINS FOR ANCHORAGE.

Pins or dowels are of much service to the porcelain worker for supporting crowns and bridges, but there is seldom a time when greater strength cannot be obtained by means of porcelain anchorages for restoration of parts of teeth, and often for crowns. Some years ago I met with a difficult case in which platinum pins to retain the restoration were entirely inadequate, and I devised a scheme of retention which has since proved highly satisfactory to myself.

The case mentioned was that of a boy of ten years, whose central incisor was broken straight off above the pulp without exposure. It was restored in Europe with platinum pins, and twice the same way later on in Philadelphia. The boy was a vigorous fellow, devoted to foot-

ball and other forms of athletics, which were in no way conducive to the retention of a porcelain tip on an anterior tooth. The third time it was put on with platinum pins, and deeper anchorage was secured, with much suffering to the patient, as the tooth was extremely sensitive—even to air in breathing—but

FIG. 23.

it lasted only three months. When the patient was referred to me, I was making experiments with a nitrous oxid and oxygen outfit. I therefore kept him waiting for several days until I considered myself sufficiently skilled in producing analgesia, and I decided to try the plan I had in mind for anchorage

FIG. 25.

of the tip to his tooth. I had previously made a radiograph of the tooth, and it indicated that removal of the pulp for the purpose of crowning should not yet be resorted to, as the apical foramen was large, and the formation of the apex not completed. The young patient fortunately took very kindly to the gas, enjoying the entire operation. My plan was to make porcelain pins for retaining this incisal edge restoration. Porcelain pins are very strong, as one can judge by making one, and breaking it with his fingers. It will be found to be a very difficult task to break one of these pins, which are about 3-16 of an inch in length and of the diameter of about a No. 7 or No. 9 round bur, if they are baked uniformly from high-fusing porcelain. The platinum pins in the case under discussion were broken off level with the tooth, which, as has been said,

FIG. 24.

was so sensitive that I could not have removed the pins without the use of nitrous oxid. I enlarged the holes left by their removal with a new fissure bur, securing the greatest diameter which the tooth would allow (see Fig. 13), leaving little more than enamel for walls. Next, tubes of platinum foil were made, closed

FIG. 26.

at one end and unfinished at the other. A piece of platinum foil was burnished over the broken surface of the tooth, and holes punched in it to correspond with the pin holes in the tooth. While keeping this latter piece in position on the tooth, the tubes were inserted through the punched platinum into the holes in the tooth (see Fig. 14), and the pro-

jecting ends burnished down. This impression was then waxed up to the desired contour of the tooth (see Fig. 15), removed, and invested on a fire-clay slab. (See Fig. 16.)

A very good articulator, which I described in the *Oesterreichische Zeitschrift für Stomatologie* of last year, may be made with a small brass hinge or with an ordinary bridge articulator. A sheet-metal tray is made to hold the fire-clay slab and soldered to the lower part of the articulator (Fig. 17). The piece under construction can thus be removed for baking and returned to the articulator whenever a measurement is required. For baking the pins or columns, the tubes were filled with foundation porcelain, and, while still moist, slit across their diameters from top to bottom with a steel nerve bristle. These were baked to the point where they were just beginning to glaze, and the shrinkage was filled in with additional porcelain. The restoration was then completed in high-fusing porcelain. (See Figs. 18 and 19.) This incisal restoration has been in place for two years, and has brought peace to the heart of a worried mother.

Cylindroid anchorage for compound inlays. This cylindroid principle of anchorage applied to any compound inlay will be found to give a very strong anchorage. Split bicuspids (see Fig. 20) that I formerly restored by baking a pin in the inlay are now more confidently and satisfactorily repaired in this way, as are all large molar restorations. (See Fig. 21.) A large proportion of the fillings show no distinct column or cylinder, but the principle is embodied in them, the square base and the encircling of the cylindroid part by the dentin (see Fig. 22) preventing lateral displacement.

RESTORATION OF FRACTURED CORNERS.

Probably the most difficult task the porcelain worker is called upon to fulfil is the restoration of a corner, fractured by trauma, in a thin, anterior upper tooth. (See Fig. 23.) There is no filling above it to remove for anchorage, and the dentin is usually very sensitive. Here the same principle may be used in a somewhat different way, yet taking advantage of the square base and constriction of dentin and enamel about the cylinder. The tooth is too narrow to make the cylindrical excavation longitudinally or axially as in a larger filling, so it is made linguo-labially (see Fig. 24), entering from the lingual surface with its base extending almost to the labial surface of the tooth. (See Fig. 25.) When the tooth is extremely thin, this anchorage is made quite large in diameter, and flat to avoid the pulp. A radiograph is first made of the tooth outlining the pulp, and observing also the apical area as to its degree of completion. Being inserted from behind (see Fig. 26) instead of laterally, the only way in which this restoration can be removed is in a lingual direction, which is the direction in which most of the force of mastication is exerted against it. This, in my opinion, is a much more satisfactory way of restoring these teeth than the use of metal attachments or pins. With the assistance of the radiograph and the administration of nitrous oxid and oxygen, sufficient excavation may be safely obtained.

Some knowledge of the effects of translucence of the varying porcelains and of the opacity of the cements is necessary, as is a knowledge of carving and baking the various porcelains in order to insure acceptable results.

[See also *Discussion*, under "Proceedings of Societies," this issue.]

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, D.D.S.Univ.Pa., L.D.S.Edin., Edinburgh, Scotland.

(Continued from page 612.)

(II.)

CHAPTER IV.—Superiority of the Tube Tooth.

THE tube tooth, as we have already seen, differs from the plain tooth* in one notable essential, viz, that its attachment is effected by means of a central tube into which a post or pin is introduced. A few of the advantages claimed for it are as follows:

It is adaptable in any situation on both jaws, and is much stronger than any other form of tooth. Being supported over its whole surface, the greatest strain in occlusion falls mostly in a vertical direction upon the crown, whereas in a plain tooth the impact of the bite is less evenly distributed.

In plate work its use entirely removes the danger of warping in soldering which sometimes happens in fixing flat teeth to a gold plate.

Its range of adaptability is much greater than that of any other tooth. A tooth, however large or of whatever type, provided there is enough bulk of porcelain and it be of suitable shade, can be ground and shaped to any desired form, and the porcelain being of the same texture throughout, it can be polished perfectly.

The tube tooth can be used for all classes of work—crowns, bridges, and plates, either of gold or vulcanite.

Because of its adaptability a small stock goes a long way. Moreover, a tube tooth misfitted can generally be used again for another case.

Being a more faithful reproduction of the natural tooth, it feels more comfortable to the tongue. Moreover, it renders articulation more easy and distinct, and prevents detection when the mouth is opened.

It is more easily kept clean, because backings are done away with, better supports being substituted which, being surrounded by porcelain, are out of reach of any impurity.

For crown work, tube teeth have all the advantages already enumerated, and in addition can be more perfectly and directly fitted to the root than any other form of porcelain crown. When mounted they retain unimpaired their translucence, a quality so often destroyed by a metal backing. Their most marked susuperiority over all other forms of all-porcelain crown is their almost limitless application.*

Having thus stated in a general way

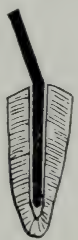
* The term "plain teeth" is used in the S. S. White Co.'s Catalog to denote teeth with platinum pins either for plate or vulcanite work—exclusive, of course, of gum sections which also have platinum pins; whereas in the catalogs of English manufacturers the teeth for plate work (plate work means metal plate, usually gold) are called "plate or flat teeth."

* These claims on behalf of the tube tooth were brought forward by the author in a paper read before the World's Columbian Dental Congress in 1893. Time and experience have served to show that these were under rather than overstated.

the advantages which tube teeth possess over other forms, it is proposed to consider in greater detail the special advantages of their use, particularly in crown work; and it will be necessary, in order to establish these beyond controversy, to point out further some of the weaknesses inherent in other types.

Adaptability is doubtless the outstanding feature of the tube tooth in whatever class of work it is employed, but its superiority is probably more marked when used in crown work than in any other branch of dental work. It has been already stated that there is no limit to the size of tooth which may be used, that the non-platinum tube rod is indeed as suitable as the tube tooth; and the only limit to the employment of the tube tooth is in the case of an abnormally close bite. These points alone make the tube tooth unique among porcelain teeth.

Fig. 26.

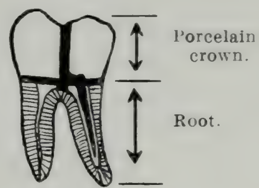


Section through tooth root, showing solid post in central canal.

Another advantage is with regard to the position of the post in relation to the crown, which can be varied more than in any other form of detached-post crown owing to the fact that any or all of its surfaces may be ground in any direction, and afterward polished so that it can have a surface like new. It is not necessary, therefore, though it is generally advisable, to have the post in the center of the tooth. Moreover, such variations as are obtained in this way could be still further extended by bending the post (Fig. 26) or by reaming out the canal—but this latter is unnecessary in the case of tube teeth, though often required when other forms of crowns are employed.

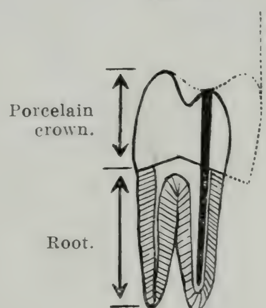
Thus it will be seen that the variations obtainable with regard to the crown in its relation to the post are greater than with any other form of crown. Also in certain cases—such as, for instance, in a molar—the post carrying the crown need not be continuous with that which enters the root or roots (Fig. 27). Again, in the case of an upper first bicuspid when from any cause only one canal, say the lingual, is available, and a straight post is used, a tooth sufficiently large to cover the buccal aspect of the root and project well on the lingual surface may be selected and ground to fit root and bite. The projecting lingual portion may then be ground off, leaving the crown, with the pin, nearer the lingual aspect (Fig. 28). When both canals can be utilized, separate posts may be placed in each, and

Fig. 27.



Section through lower molar, to show use of separate pin to carry porcelain crown.

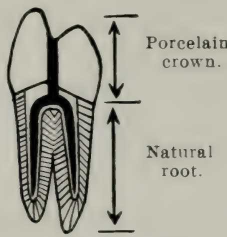
Fig. 28.



Section through double-rooted tooth with artificial crown of porcelain having dowel and post in one straight piece and in lingual canal. Dotted line shows original size of tube tooth used for crown.

these joined together by means of a central post to carry the crown (Fig. 29). In the case of a front tooth, the post may be inclined toward the cutting edge of the tooth, the face of which can be ground away so as to have the maximum amount

Fig. 29.

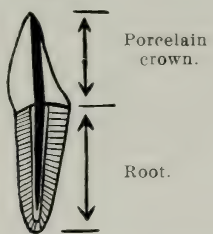


Section through double-rooted tooth with artificial crown of porcelain mounted on solid post.

of porcelain available on the lingual surface, where the greatest amount of strength is needed (Fig. 30), or that part of the post which carries the crown may be cut off and readjusted (Fig. 31).

Thus the variations which can be effected are extensive, and can be adapted

Fig. 30.

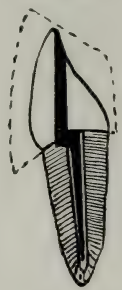


Section through single-rooted tooth with artificial crown of porcelain, to show position of solid post.

with a view to conserving the greatest available amount of strength in the post, and at the same time obtaining the maximum amount of strength for the crown. Numerous opportunities for varying the application of these methods will suggest themselves and be met with in practice.

It has been seen from the reasons already given that the tube tooth has a greater range of adaptability with regard to the relation of post and crown than any other form; but sufficient prominence has not been given to the part taken in this by the nature of the tube and post and the very important part these play in assisting accurate fitting of the crown. In the first place, the tube itself, as already seen, passes through the center of the tooth, which may thus be of any length provided that it is long enough. It can thus be fitted to the cap or root without fear of becoming too short in the process of letting down, and when let down attention can be directed either to grinding off the surplus to suit the bite, or, if the tooth be excessively long to begin with, the surplus can be cut off in a

Fig. 31.

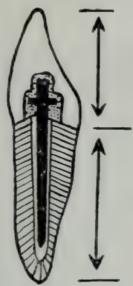


Showing how a large piece may be cut off face of tooth, and pin placed labially, in order to give maximum strength lingually.

way hereafter to be described. In consequence of this its adaptability is still further enhanced, while in addition the post, which should fit the tube accurately but easily, acts as a sure guide in letting down the tooth to the base. The importance of this never seems to have been realized in any other type of crown, otherwise provision would undoubtedly have been made to meet it. Indeed, attention does not appear to have been called to it in crown work, though the value of the pin as a guide to accurate fitting of tube teeth in plate work has always been fully realized—so much so, indeed, that the easy but accurate fit of pin to tube has been looked upon as a matter of

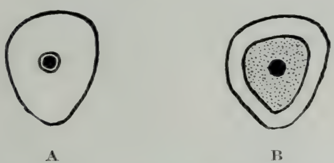
the utmost importance by the tube-worker, a too loose fit of pin to tube being known from experience to result in loss of time in attempting to secure accuracy of fit. It is obvious, therefore, that what holds good with regard to fitting a tube tooth to a plate must of necessity apply in fitting a tube crown to a cap, or directly to a root. It is of importance,

Fig. 32.



Section through single-rooted tooth, showing mode of attachment of Davis crown. Dotted portion is cement.

Fig. 33.



A B

White portion, porcelain: dotted portion, cement.

A, cross section through bore of tube crown, showing small quantity of cement required.

B, cross section through bore of ordinary porcelain crown, showing large quantity of cement required.

therefore, to employ the standard size of posts or pins, except in such exceptional cases as will be dealt with later, and to reject any teeth of which the tubes do not conform to the sizes given.

The important part taken by the tube in the older forms of crown—those in which the tube or hollow perforation passed through the crown, such as the Foster, the Gates-Bonwill, or the How dovetail crown—calls for further consideration. The points which were believed to be of greatest consequence and to which most attention was paid were the anchorage of the crown to the post, limitation of the amount of grinding of the crown to the base to meet the bite, and a fairly large amount of lateral movement having the post as a center and with a view to the smallest amount of bending or mutilation of the latter. (See Fig. 1, Chap. I.)

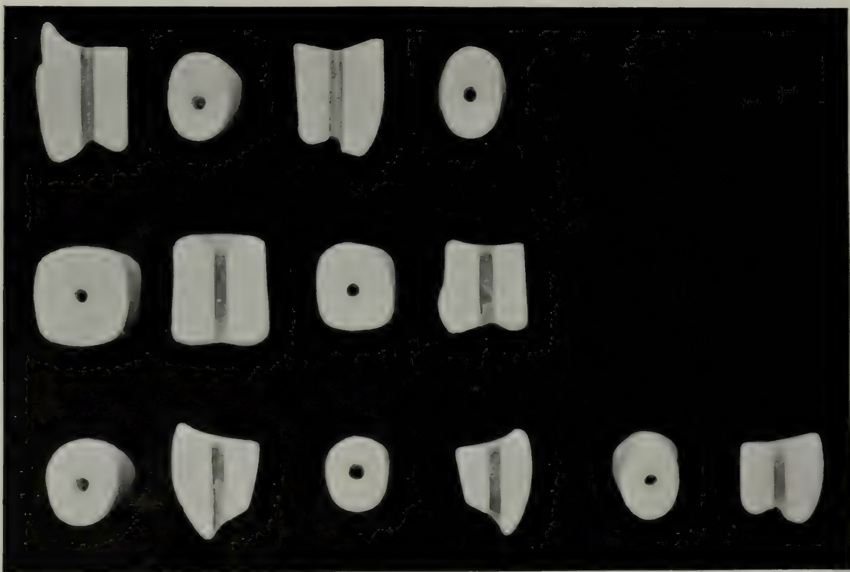
With regard to the question of anchorage, experience has proved that not only was the attempt to gain extensive anchorage of crown to post by means of an abnormally large tube a mistake in itself (resulting, as it did, in much weakening of the crown by diminishing the amount of porcelain and substituting in its place (Figs. 32 and 33) a mass of superfluous anchorage material), but that the maximum amount of attachment of crown to post can be had with a very thin layer of cement, and that rotation of the crown on the post, so much feared, is never met with if ordinary care has been used in cementing the crown to place. Moreover, experience has proved that it is practically impossible to separate crown from post when once they have been so united. If further proof were necessary to show that the smaller the amount of cementing material used the greater the strength of anchorage resulting, it is afforded by the various inlay operations where endeavor is made to have such accuracy of fit as shall insure the use of the smallest possible amount of anchorage material. The provision made for longitudinal adjustment, by having the post pass right through the body of the crown, while excellent in itself, had its value lessened by the defects already mentioned in the crowns themselves. In consequence there was always the fear that if much porcelain had to be ground off the base of the crown, anchorage of crown to post would be sacrificed. The result of this attempt to obtain the maximum amount of anchorage combined with a fair range of lateral adjustment was a series of crown types deficient in amount of porcelain, hence in strength, and with the further disadvantage of limitation with regard to adaptability. The provision for lateral adjustment was limited in amount, and

little could be obtained except at the expense of still further weakening an already weak crown.

The reasons advanced for the failure of the earlier types of crown to meet the requirements of adaptability and strength apply with equal force to the present forms of detached-post and fixed-post crowns, in which the range of longitudinal adjustment is still further limited owing to the post only passing about half-way through the crown. In consequence of this, their use demands an unnecessarily large selection of forms and sizes, and frequently an excessive sacrifice of root surface. With the tube tooth, on the contrary, all these objections are done away with, and the number of forms reduced to a minimum: indeed, it has been shown that even tooth forms are unnecessary, but that porcelain blocks or rods with a central tube formed in them can, if required, be utilized for all purposes. Objection may be taken to the tube passing entirely through the body of the crown, and being thereby a possible source of weakness, but this is negatived by long experience. However, Fig. 34, which shows sectional views of the special forms of non-platinum tube teeth, affords proof to the contrary.

With regard to the tube rods mentioned in the previous chapter, it will be noted that these further extend the application of the principle of the tube attachment and increase the area of their adaptability.

FIG. 34.



Base and longitudinal sections of some forms of non-platinum tube teeth, showing strength of porcelain.

There remains another point which calls for consideration here, namely the reluctance always shown to grinding any part of the body of the tooth other than the base and occlusal surface. While expression is seldom given to this, it is doubtless due to the difficulty which has been experienced in satisfactorily polishing the ground surface of molded teeth, which cannot be got to look so well after the surface glaze has been removed. This objection does not hold good with poured teeth, which, as already stated, can be given as perfect a polish as when

new. There remain, however, many cases where a dull or flat polish is better than a brilliant one. In these the molded tooth would not show to such disadvantage. Moreover, it should not be difficult to modify the composition of the materials so as to combine the best points of each.

In the introductory chapter, mention has been made of the suitability of the tube tooth for conversion into that of any other type of detached tooth crown. Herein it differs from all other existing types, which lend themselves only to that form of attachment for which they were designed. The reason for this will be obvious when one remembers that the tube tooth or porcelain rod has a simple

FIG. 35.

FIG. 36.

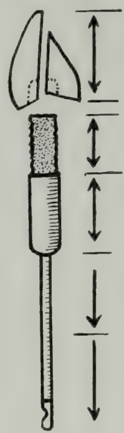
FIG. 35: Longitudinal section through tube crown, showing central tube running right through.

FIG. 36: Longitudinal section through ordinary form of porcelain crown.

tube, which passes through the body, and that there is no further weakening of the porcelain such as is met with in other crowns. (Figs. 35, 36.) Further, owing to the fact that any size of tooth can be employed, abundance of material is provided whereby any desired form of anchorage can be reproduced to conform with that of any existing type, thus bringing within our reach a simple means of replacement in case of accident—often no easy matter when one is far from a dental depot; and as the forms of detachable crowns are now so numerous, one cannot attempt to stock all of them. Even if one adheres to one form only, a fairly large stock is called for to meet average requirements. The chances, then, of a patient who may want a crown replaced having had the same type of tooth we are in the habit of using are not great.

The tube of the tube tooth or rod can, however, be quickly ground to the form of the basal anchorage of that of any type of crown. Anyhow, it can be

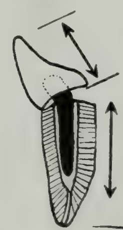
FIG. 37.



Method of converting tube crown into one of the ordinary type.

adapted to a form of anchorage which will enable it to conform to the proximal end of any post or dowel by means of suitably shaped Butler's carborundum points and diamond points, meanwhile

FIG. 38.



Section through single-rooted tooth, to show difficulty of adjusting a Logan crown when it is necessary to place the crown labially to the root.

retaining those other advantages which it has been shown to possess (Fig. 37).

Comparison having been made between the tube tooth, porcelain rods, and various forms of detached-post crowns, and some of the disadvantages of the

latter pointed out, it remains to be considered whether the fixed-post crown is free from any or all of the latter.

Taking the Logan crown as typical of the best form of fixed-post crown, it will be seen from Fig. 38 that its range of radical adjustment is limited by the difficulty of bending the post to a sharp enough angle close to the point of junction between post and crown, when bending is called for, and that further adjustment can be obtained only by enlarging the canal, with consequent weakening of the root. Furthermore, alteration of the base of the crown in relation to the root surface must be had either by grinding off from the labio-cervical or approximal surface or surfaces, or from both, or else by removing a corresponding amount from the surface of the root. These defects alone have proved of sufficient importance to diminish the popularity of the fixed in favor of the detached-post crown, while both fall short of the tube crown with regard to the points of adaptability already mentioned.

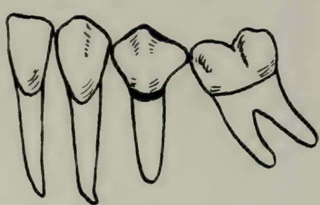
Another advantage in the use of tube teeth, which is shared with the various forms of detached tooth crowns, is that the necessity for soldering is done away with, as well as the danger of fracture or discoloration.

There remains yet another point with regard to the use of tube teeth which is shared by other forms of all-porcelain crowns, and to which special attention is drawn, namely, the advantage which these possess over plain teeth in presenting a natural convexity of outline in their approximal surfaces. This is of particular value where there is spacing, even if it should be slight, and prevents that flattened appearance and dark shadow produced by a metal backing. The advantage with regard to tube teeth in this connection is as apparent when they are employed in bridge, plate, or vulcanite work as when they are used for crowning only.

In plate work these advantages are also apparent, while in addition the dangers which arise from warpage in soldering are eliminated. Moreover, the diminution in the amount of solder is a further substantial gain, as the liability to discoloration is lessened and the karat of the piece is maintained at a higher standard.

Approximal contact. The matter of approximal contact where normal conditions prevail can be successfully carried out by means of the ordinary all-porcelain crown in general use. Cases occur, however, in connection with the grinding teeth in which the space is too large to admit of approximal contact being obtained by the substitution of a single porcelain crown, and yet too small to allow of the satisfactory insertion of two crowns. In these cases resort has been had either to an all-gold crown with exaggerated approximal contour to obtain contact, or a porcelain-face crown,

FIG. 39.



Shows excessive contour on first bicuspid to fill up space.

or a built-up porcelain crown treated in the same manner, but on referring to the chapter on tube teeth and porcelain rods it will be seen that these are pre-eminently adapted to meet the above class of cases, and in a manner not hitherto suggested (Fig. 39).

SUPERIORITY OF THE TUBE TOOTH OVER PORCELAIN AND PLATINUM CROWNS.

During the last twenty years, and particularly within the last decade, a great deal has been written regarding the application of porcelain work in connection with crowns and bridges, and a great deal of time and effort is being expended upon a line of work which is never likely to yield the results looked for, except in the hands of an expert. Apart altogether from the expenditure of time necessary for the attainment of even moderate success, there remains the al-

most insuperable element of weakness due to the fact that fused porcelain* is inferior in strength to that produced by the manufacturers; and it is difficult to understand why effort should be expended in building up masses of porcelain when the makers of artificial teeth and crowns supply us with an abundant selection which in texture, appearance, and strength surpass any porcelain which we can produce under less favorable conditions and with the limited knowledge which we possess compared with those who have made the manufacture of porcelain teeth their special study, indeed their life-work. From the claims generally advanced in favor of built-up crowns of porcelain on a platinum base, one would suppose that the advantages claimed are unobtainable in any other way. In reality they are the claims which are brought forward for all ready-made crowns, and readily fulfilled by most of them, though from what has already been said regarding the various forms of these which have been, and are, before the profession, it will be seen that little can be said in their favor when compared with the tube crown. The built-up crown, indeed, owes its good qualities mainly to the porcelain facing—nearly always some form of the plain tooth.

The following claims for the application of porcelain body in this connection are those usually advanced as being the most powerful arguments in its favor. These are—Esthetic, Hygienic, and Mechanical. With regard to the first, it is true that there is an absence of display of gold, but this holds good in the case of the ready-made all-porcelain crowns, such as the S. S. White Detachable, the Logan, etc., and with regard to the metal backing this also is absent in these and other ready-made forms. On the other hand, these latter have an advantage over the built-up crown in so far as they already consist of the requisite form and are better than a crown formed from a facing or veneer built up with porcelain body, as such added porcelain, being different in color and texture, usually alters the color and translucence of the facing as much as does a metal backing—allowance for which is usually made when a metal-backed crown is used.

The hygienic claims stand on surer ground, but there is less in them than their advocates would have us believe if the porcelain-face crown is skilfully constructed. There is also the mechanical question, which resolves itself into one of strength of material. We have seen that the porcelain of the manufacturer is stronger than anything which we can hope to produce, and this is so well recognized that those who favor built-up porcelain crowns make a point of insisting upon every effort being made to reinforce and strengthen the platinum base with a view to placing as little dependence upon the strength of the porcelain as possible; and this precaution is undoubtedly necessary when one considers how weak is the union between platinum and porcelain, and how feeble the union of the porcelain facing and the fused body is apt to be.

The question of the time spent upon the building-up of a porcelain crown is one which is seldom touched upon, but those who have done such work themselves, or seen it done by others, are well aware of the tediousness of the process, which is further increased by the necessity for slow cooling. For this it is wisely recommended to let the investment remain in the muffle over night to allow it to cool gradually; unless this precaution is taken, brittleness of the porcelain results. The makers of artificial teeth recognize perfectly well the importance of slow, careful annealing to obtain strength and toughness, though it is doubtful if they always act in accordance with their knowledge. All this means the expenditure of time, and while this is a matter of importance, one would not grudge it if the results corresponded with the expenditure of time and skill, but that these fall short of the desired result is

* Throughout these chapters the term "fused porcelain" is used to denote porcelain as made by the dentist, while the term "manufactured porcelain" is employed in connection with the manufactured article, such as plain teeth crowns, porcelain rods, etc.

obvious to those who have had practical experience and have also noted the work of others. This is not to be wondered at when one considers the difficulties to be overcome, and the exceptional skill required, to obtain good results, points which most writers lay particular stress upon, and doubtless with good reason; but these only serve to emphasize by contrast the simplicity in the use of the tube tooth, or porcelain rods, for crowning purposes, whereby artistic results, along with other advantages already pointed out, are obtained by the simple process of grinding to the required form. Thus one avoids the many pitfalls incident to porcelain dental art, in which so many calculations must be made in order to avoid the dangers of shrinkage, not to mention those of color and strength, which are an ever-present menace to the work of the dentist.

It seems needless, however, to elaborate further the weak points in the built-up crown—which in passing it may be observed are more accentuated in the case of the bicuspid and molar than the front teeth, though shared by both.

Not until a porcelain is produced which will be much stronger than anything we have at present—as strong indeed as the best type of porcelain teeth, capable also of being rapidly fused and quickly cooled without loss of strength or color, can there be any hope that the built-up crown will hold its own against even the ready-made form, much less against the tube tooth.

The foregoing arguments apply with even greater force when porcelain is used in the construction of bridges; and this matter has been dealt with at some length because of the marked tendency toward the employment of fused porcelain for this purpose, where the advantages it possesses under other circumstances, such as for porcelain inlays and in continuous-gum work, makes it unsuitable for the purpose already spoken of; while, on the other hand, manufactured porcelain, owing to its greater strength, "toughness," and other qualities, presents the ideal material for this purpose.

Strength. It is probable that owing to their closeness of texture English teeth are stronger than molded teeth (see "American Text-book of Prosthetic Dentistry," by C. J. Essig, ed. 1897, p. 265), and it is claimed by the makers that tube teeth are stronger than plain ones. The truth of this seems to be borne out by those who have had much practical experience with them, and these claims apply also to all forms of English teeth so called, though the term "poured teeth" describes them better, as they are manufactured also in America.* They are made at one baking in the furnace, the body and glaze being combined, and thus these teeth differ from molded teeth in which the body is biscuited or baked, and the glaze or enamel added and afterward fired. While the

Fig. 40.

Shows best position for tube.

former method results in a porcelain of undoubtedly greater strength and closer texture, which, after grinding, enables it to be completely restored to its original condition by polishing, it is at the same time slightly less translucent; but the difference between these teeth is now less marked than formerly, owing to modification with regard to the composition and manufacturing of molded teeth.

The mode of attachment of the tube tooth to its base is far stronger than that of any form of plain tooth or removable facing, or indeed of any other form of crown. This is largely contributed to by the possibility of altering the position of the post and tube in their relation to the body of the tooth, so that, by grinding, the maximum amount of strength of

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* English tube teeth are poured teeth, and are not made in America; but plain teeth made in the same way—that is, poured—are made in America.

porcelain can be left where it is most needed (Fig. 40); and further, it may be noted that if the lingual surface of the tooth body be ground through from top to bottom, exposing the pin on the lingual surface in its whole length—as, for instance, in the case of a front tooth —the attachment is still a fairly strong one, as will be seen from the accompanying illustrations (Figs. 41 and 42). Under such abnormal conditions the porcelain face would have at least as secure an attachment, indeed a stronger one, than a plain tooth unprotected by backing at the cutting edge, which in certain circumstances is unavoidable, because the porcelain would be supported from tip to base by say three-quarters of

Fig. 41.

Fig. 42.

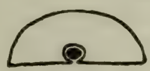


Fig. 41: Showing back of tooth cut away, exposing tube its full length.

Fig. 42: Cross section of same.

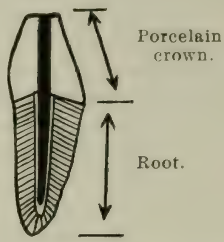
the diameter of the post. It is not, however, suggested that it would be prudent to risk such an attachment, but the strength of the attachment in comparison with a pin tooth will be sufficiently obvious.

With regard to the back teeth, their strength is even more marked, because the greatest strain in occlusion falls mostly in a vertical direction, and so is more evenly distributed. In consequence, these teeth can be ground to an apparently dangerous thinness.

In the case of an edge-to-edge bite, this property is of the greatest value, and, taken in conjunction with others, pre-eminently fits the tube tooth for use in such cases (Figs. 43 and 44).

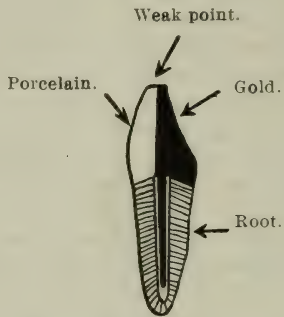
Much that has been said in dealing with the special advantages which tube teeth and non-platinum tube rods possess in crown work applies also to their use in plate, vulcanite, and bridge work, in all of which they can be relied upon to yield even better results than would appear from the claims which have been advanced in their favor and which so far have been directed to the mechanical rather than the artistic aspect of this question. In consequence it is worth while giving attention to the latter.

Fig. 43.



Shows position of pin in edge-to-edge bite.

Fig. 44.



Shows weak point in Richmond or other porcelain-face crowns.

Porcelain Teeth and Crowns in Their Relation to Artistic Dental Prosthesis.

Few subjects in connection with our work have given rise to more discussion than art in its relation to dental prosthesis, and this has centered largely around the question of the supply of porcelain teeth. For the most part criticism has been directed against makers regarding the alleged deficiency of forms, as well as numbers and types of these which they produce. Those who have been most active in advancing their

views on the subject of new tooth forms have seldom brought forward practical suggestions with regard to the types and sizes of these which would suffice to meet the varied requirements of our work. On the few occasions on which they have done so, these have failed to meet with that general acceptance which their advocates felt justified in expecting. After all, this is not surprising, because the problem cannot be so simple as it is made to appear, and so its solution must be looked for in a direction not hitherto suggested; otherwise it is inconceivable that the makers of teeth would be so blind to their own interests as to keep on multiplying forms for which there would be no demand. In matters that give rise to much controversy the truth generally lies midway between opposing views, but here the argument seems distinctly in favor of the makers, who, as most fair-minded men must admit, have responded generously and well to our persistent demands for new types and classes of teeth and crowns, and so have afforded abundant proof of the identity of our interests with theirs. It is true that the champions of the limited selection of perfect tooth forms blame the profession as well as the manufacturers, but the attack upon the former is a feeble one. We have been content to rely on the manufacturers, not only for the number and variety, but for the artistic quality of these teeth, which in this respect are marvelously good when one considers the serious limitations imposed by the various forms of plain teeth. This dependence upon the skill of the manufacturers is not as it should be—as, after all, it is not for them to teach us the artistic side of our work, though the truth is that they have done more for us in this way than we have done for ourselves. Nothing but harm can result from attempts to further shift our responsibilities on to them, responsibilities which they doubtless would accept, but which would only furnish added proof of our ineptitude and place us under further obligation to their artistic and technical skill—when probably we would continue to demand the privileges of the artist after having surrendered outright! Artistic results are not to be sought along the lines of more perfect manufactured artificial teeth designed to imitate more closely the natural ones. For these we must rather depend upon our skill in shaping the raw material to meet our needs. Hitherto all suggestions regarding this have had in view the grinding of the cervical, or incisive, margin of the front teeth, and in exceptional cases their approximal surfaces, and reducing the cervical or coronal surfaces of the grinding teeth. No consideration seems to have been given to the greater and more vital alteration which may be effected by shaping their other surfaces, more particularly the labial and buccal. Doubtless the most powerful argument against this is the fact previously stated that the molded tooth so largely used does not lend itself so readily to satisfactory polishing after its surface has been broken as does the poured tooth, though the line of demarcation between these is less marked than formerly. There seems little doubt that these have been factors in deterring men from encroaching freely on such surfaces, which are undoubtedly those which lend themselves most markedly to alteration of type.

It is useless to maintain, as some do, that our requirements can be met by a strictly limited set of types or forms and sizes, without taking into consideration the points mentioned. Those who have championed the limited and, as they claimed, perfect types have brought forward a host of arguments most of which are individually sound, but collectively, for the purpose for which they are employed, are misleading and false, the proof of which lies in the fact already stated, that the practical expression of their ideas has met with failure.

Whatever the failings of the manufacturers may be, and doubtless they are not few, it has yet to be shown that they are unwilling to meet our requirements if only these are properly presented.

It is not to be assumed that the writer suggests that only a few forms of porcelain teeth and crowns in a large variety of shades should be at our disposal, or that the present huge selection is al-

together needless. But our requirements will certainly never be completely met along the line of multiplication of tooth forms without regard to the possibility of shaping and polishing all their surfaces, and the ordinary forms of teeth and crowns do not lend themselves in all cases to this, for the reasons already given. Neither is it to be assumed that it is held advisable to carve up all teeth from tube forms or porcelain rods, or that from choice these should be larger than is strictly necessary. This would be going to the opposite extreme, and as the writer fully realizes the importance of conserving one's time and nervous energy, he merely suggests that advantage be taken of the materials to hand in the various forms of tube teeth, the supply of which is now large enough to meet all needs without much grinding. Cases, however, do arise which call for extensive modification of tooth forms, and it is well to be able to produce what we require from the rough block, and the experience which this yields is of incalculable value in training hand and eye in a manner and with a thoroughness impossible in any other way. That some such form of special training is called for is attested by the experience of men well qualified to judge. Indeed, no thinking man will deny that prosthetic dental art calls for more than the mere selection and arrangement of teeth—although, to judge by the high-sounding phrases and promises of some of our self-appointed leaders in matters pertaining to the subject spoken of, it would seem that it is only necessary to have a strictly limited number of shapes, sizes, and colors of teeth, all perfect reproductions of the natural ones. Provided with these, we are told by these advocates, it should be well within the powers of all of us to obtain such results as were formerly undreamed of. He is regarded as a poor artist indeed—or a genius—who contents himself with giving only the finishing touches to work he has relegated to others. Almost without exception the artist has begun his career by becoming a craftsman, and has learned from the clay, the rough marble block, or the canvas, and so should the student of prosthetic dental art. Fortunately the necessity for this is apparently being realized, as is proved by the endeavors which are being made to train students in the art of carving up teeth from ivory and other similar materials, to imitate the natural teeth. All such teaching is highly advisable, and every encouragement should be given to further expansion in this direction, and to the revival of the old-time form of manual training afforded by the carving of plates and teeth from the rough ivory block. It is doubtful, however, if such training goes far enough, or if the methods taught are likely to be useful in practice, valuable though they admittedly are in training the student in manual dexterity and appreciation of form. As a most important adjunct, then, to present methods, the writer would strongly urge that students be taught to grind and shape up teeth from porcelain rods; and he believes that no training could be afforded better calculated to familiarize the student with the variations in tooth forms, and so furnish him with a practical knowledge of the surface anatomy of the teeth which he would find it difficult to acquire in the same thorough way by any other mode of procedure. By the time he had learned to shape up a few upper and lower sets of teeth in this way, much experience would be gained, and if the training were extended to the fitting of such teeth to a rigid base, such as a metal plate, or to capped roots, this, in addition, would serve to revive the almost lost art of fitting teeth which the enormous selection of these has done so much to kill. That tube teeth supply this training and yield the results claimed has been abundantly proved by those who practice this line of work. The most common test of the student's skill in plate work is the shaping and fitting of a set of single gum teeth to a metal plate. Surely a much better test would be afforded by the shaping-up of a set of tube teeth, either from larger forms or from tube rods, and afterward fitting them to a metal plate. The experience thus gained would be of much greater value afterward, as a large proportion of the cases the young dentist

will have to deal with in his professional career will be better met by the use of tube teeth than by those of any other form, and he will find that it does not take long before his manual dexterity so far approximates the level of his artistic aspirations that he will seek for fresh models, which are constantly before him in his everyday life.

If the present forms of porcelain teeth met all our reasonable requirements, the decadence of the art of tooth-fitting would not be such a serious matter; but, as formerly stated, they fall short of this, and as being mostly veneers they do not lend themselves to the acquirement of the artistic and technical skill of which we speak.

It is to be hoped, then, that less will be heard in future of the necessity for perfect porcelain tooth forms, and that it will be realized that it is as impossible to produce these commercially as it would be undesirable to have them, because of the evil which would result from that lack of artistic stimulus so necessary for the maintenance of a high order of skill. The tooth forms at our disposal fulfil all that can be expected of them, and it is no fault of the makers that most of them are practically only veneers. Moreover, it is not herein suggested that the tube tooth can wholly supply the place of the flat tooth, but that it can do so in a great number of cases is evident. Had the profession shown a practical desire for better tooth forms, their wishes would have been met long ago, and it would not have been necessary for the makers to withdraw many of their natural pattern tooth forms and countersunk teeth, of which a reference to the tooth catalogs of the S. S. White Co. and other makers affords conclusive proof. Indeed, the efforts made by the manufacturer to educate the profession by furnishing them with various types of natural tooth forms, such as the countersunk, have met with scant encouragement. The fault, then, has been on the part of the dentist, and not on the part of the makers.

(To be continued.)

GRAVING IN AMALGAM.

By MILTON J. WAAS, D.D.S.(Univ.Pa.), Munich, Germany.

THERE is no doubt that the dental profession owes Dr. J. Lowe Young a debt of gratitude for having drawn attention so forcibly to the necessity of restoring the anatomical features of the masticating surfaces of gold inlays, by carving in the wax impression the cusps and planes, the grooves and sulci and pits belonging to the natural teeth, so as to restore the full masticatory efficiency of the restored tooth. Unfortunately, the idea has rapidly gained ground that it is impossible to accomplish this in any other filling material. Such an idea is entirely erroneous, as this communication is intended to show.

POSSIBILITY OF PERFECT REPRODUCTION OF OCCLUSAL SURFACES IN OTHER THAN CAST GOLD FILLINGS.

In the recent report of the Committee on Practice of the Dental Society of the State of New York, published in the DENTAL COSMOS for November 1913, it was stated that—

> With the facilities now available to every dentist, the day of the ill-fitting, malshaped, nondescript plug of gold must soon pass. It must give way to the perfect-fitting, well-contoured gold inlay, in which the cusps and planes, the grooves and sulci, are present, and the natural anatomical lines of the tooth surfaces are reproduced. If the masticating

efficiency of a broken-down molar or bicuspid is to be restored to normal, the metallic or porcelain restoration must reproduce in detail the characteristic outlines of the occlusal surface of the tooth. While a good general contour and a firm contact point can be obtained with either an amalgam or a good gold foil filling, or even a porcelain filling, it is impossible, with any of the three mentioned, to obtain a perfect reproduction of the occlusal surface. This can, however, be obtained by using a cast gold filling or restoration, because it is entirely possible to carve the wax model to a nicety, showing all the anatomical lines.

Such a statement is not in accord with the facts, and cannot be accepted, but must be examined in detail in order that many who have read it and the discussion following may not be misled.

It is possible to reproduce the anatomical features of the tooth in either gold foil, porcelain, or amalgam fillings. To obtain such results with gold foil fillings requires the use of small stones and burs to do the first rough shaping, and a selection of sharp gravers to finish the carving of the gold. Skill and dexterity is required in the use of such instruments, but the carving can and has been successfully done. In the case of the porcelain inlay, it is simply a matter of the operator's experience and the delicate manipulation in carving the porcelain before baking. It is seldom, however, that such porcelain restoration in the bicuspid and molar regions should be attempted, as it would seem that other materials are here indicated. The permanence of our work is, after all, largely dependent upon our wisdom in selecting the proper material to be used in any given case. In this class of large restorations, where the appearance of gold is objectionable, it would seem that the method of cutting away the gold from the inlay on the buccal surface and baking-in a low-fusing porcelain would offer a very satisfactory and permanent substitute.

ANATOMICALLY CORRECT RESTORATIONS IN AMALGAM.

Amalgam has been and probably always will be the most misused material employed by the dental profession. The main reason for this is the fact that it is usually considered a cheap filling, on the part both of the profession and the laity, but despite this fact, it is more often used and has saved more teeth than any other material. For those, however, who have mastered its proper manipulation, and who devote to its insertion the proper amount of time, and charge for that time, it develops many possibilities. Among these is the possibility of perfectly reproducing all the anatomical details of the lost structure. The writer, in the early part of the year 1909, attempted to do this; at first, it must be admitted, in a rather empirical and crude way, but gradually improving, until in the last two years he has worked up to the point where, on taking a plaster impression of the filled tooth, it was practically impossible to discover from the cast that any of the original tooth surface had been lost through caries. In many of these cases so much structure was missing that the pulp was extirpated when vital, or removed if putrescent, in order that the root-canals might be employed for cementing posts into them to anchor the amalgam securely. Several *confrères* have seen this amalgam work, and can substantiate these statements.

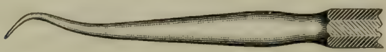
CARVING OF AMALGAM FILLINGS TO BE DONE IMMEDIATELY AFTER REMOVAL OF MATRIX.

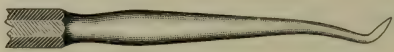
In the discussion of the report before referred to, the following statement was made: "I will admit it would be difficult to get perfect occlusion with an amalgam filling in complex cavities, especially when a matrix cannot be left in place until crystallization is complete." This is exactly the wrong idea, as it would be difficult to carve after crystallization, and it is often impossible to leave the matrix in the mouth until this has occurred. But why wait for matters to become so complicated, when it is so easy to carve the amalgam immediately after removing the matrix? This is when the carving should be done, for at this time our material is much like wax to work on, and we need have no fear of distort-

ing it, as is so easily done with a wax model. Before removing the matrix we must, of course, warn the patient not to occlude, as the filling is at first much too high.

INSTRUMENTS FOR CARVING.

After having practiced this carving of amalgam for the length of time before mentioned, and after having used many kinds of instruments for this purpose, I now use only three, which have been found most convenient and entirely sufficient. The first rough carving should be done with a pair of right and left spoon excavators of good size—I have found the Darby-Perry excavators Nos. 15 and 16 to be perfect. Then we should start with the double-ended instrument which





is here illustrated. This very simple and practical implement, which I have produced after many experiments, will do this part of the work properly, and I am very glad to donate the design to the profession. As soon as the excess amalgam is removed by the spoon excavators sufficiently to allow proper occlusion, all the rest of the anatomical features may be brought out to perfection with this instrument. One end is used for working in a mesial and distal direction, and the reverse end is employed for working in a buccal and lingual direction. First the grooves and sulci are graved out, the instrument being so shaped that it leaves the bottom of these as near like those of the natural enamel as possible. Pits may be made by using only the extreme point, while the sides flare out at such a suitable angle as to allow of the proper reproduction of the planes of the cusps. These planes, therefore, should be reproduced by using the sides of the instrument as they come out from the point. This will be seen very readily after using the instrument once, and anyone possessing an ordinary amount of ability can, after using it for a short time, produce a result that will prove a revelation to him, if he has never attempted such restorations before.

FINISHING AMALGAM FILLINGS.

At a subsequent appointment, when the amalgam filling is to be polished, the same instrument will very easily burnish all the points in the masticating surface which are difficult to reach. One will also find that this anatomical carving and polishing of the amalgam may be accomplished in very much less time than one would imagine. Moreover, one will be convinced of how much excess material is usually left on the masticating surfaces of amalgam fillings made in any other way, all such overhanging material inviting the recurrence of caries. In fact, at first it is almost a revelation to the operator how much must be carved away to get the metallic surface down even with the surface of the remaining enamel, and he will feel that he has really never done his best before. This polishing should never be neglected as being unnecessary, for the amalgam surface after crystallization, when under an ordinary magnifying glass, discloses a condition ideal for plaque formation, which is largely obviated by the polishing process. It is to be hoped that the day will soon arrive when we shall look with the same disfavor upon the operator who does not polish his amalgam fillings as we would upon the operator who neglected to polish his gold foil fillings. The amalgam should be carved when it is like wax, and polished when it is like steel. Incidentally, the instrument described will be found excellent for the carving of wax models in inlay work.

PRESENT OVERESTIMATION OF CAST GOLD INLAY RESTORATIONS.

It was also stated in the discussion of the report before mentioned that—

No previous generation of dentists has ever had at its command the possibility of restoring cusps and sulci of teeth to the degree that is now possible with the cast inlay. Or, if for the sake of argument you consider it to have been possible, it has at least not been feasible within the physical capacity of the patient and operator. To me it seems evident that the restoration of cusps, inclined planes, and sulci is the essential part of the restoration of occlusal efficiency in bicuspids and molars, and I cannot conceive that it is feasible with foil fillings, amalgam, or porcelain, even with all our present knowledge, to anywhere near approach the results in anatomical restoration that we readily get in the adaptation of the wax which can be so easily duplicated in cast gold.

That it is possible and easily feasible to obtain the same results in amalgam has, without doubt, been already proved by this communication. And it is remarkable that the idea of taking advantage of that particular phase in the physical behavior of the amalgam in which it has not yet passed from the plastic state—when it can be as readily manipulated as wax—into the solid state, has not received sufficient attention; at least it has not to my knowledge.

ADVANTAGES OF AN ANATOMICALLY CORRECT AMALGAM RESTORATION.

If the anatomical carving of the wax model and its reproduction in the gold inlay have aroused enthusiasm and been deemed necessary, how much more important it is to do the same in that filling material which is used so much more in the average practice than any other material! In many cases amalgam can be more advantageously used than a gold inlay, and we should not hesitate to spend as much time and care in doing one kind of work as the other.

Even in a practice where the small fees obtained make it seem prohibitive, if an amalgam filling of this sort be inserted and properly polished in mouths where otherwise we so often find only the dark, rough blocks of metal masquerading as amalgam fillings, many patients will doubtless be grateful and be willing to pay for the difference. After all, it takes such little additional time to make these restorations properly, and they afford so much satisfaction to the ethical and self-respecting practitioner, that this must surely become the accepted method of the future.

THE NON-COHESIVE GOLD FILLING:

A Reply to Certain Criticisms; a Reflection upon Various Means of Anatomic Tooth Restoration, and a Consideration of Certain Ethical Problems.

By A. W. SWEENY, D.D.S., Baltimore, Md.

(Read before the Academy of Stomatology of Philadelphia, at its regular monthly meeting, January 27, 1914.)

"Be Sure You're Right, Then Go Ahead."

THE importance of the subject treated in your essayist's former paper,* and the fact that much ground was left uncovered on the occasion of its presentation, owing to lack of time and the regrettable early departure of some who participated in the discussion, would seem to justify a further consideration of that subject; therefore a few thoughts are now submitted, embracing a reply to certain criticisms, reference to useful but neglected resources, some reflec-

* "The Non-Cohesive Gold Filling." By A. W. Sweeny, Dental Cosmos, October 1913, p. 1019. Also discussion, p. 1043.

tions upon the relative importance of accurate occlusal restoration as accomplished with the inlay, and tooth preservation with the filling, together with certain ethical problems therewith involved.

EVOLUTION IN DENTISTRY RATHER THAN REVOLUTION.

The clear and logical discussion of a paper sometimes proves of greater value than the paper itself, but pointless and illogical discussion, bristling with inconsistencies, is worse than useless.

The rapid advance of our profession has furnished the perennial theme for felicitation, but its advance has been halting and spasmodic rather than steady and continuous. Too frequently we have been led astray by false teaching, and have been forced to retrace our steps in sorrow and disappointment.

All lasting progress, whether in the upbuilding of nations, the development of industries, or the advancement of the arts and sciences, has been realized rather through a process of addition than of substitution. Though starting sometimes in revolution, subsequent advances have been brought about through evolution. Our nation was born amid the stress and turmoil of revolution, but oft-repeated revolutions would not have helped it to its present place among the nations of the earth. So it must be with our profession; yet we have recently been told that we are on the eve of another revolution.

THE MERITS OF AMALGAM FILLINGS.

Though space and argument were chiefly devoted in your essayist's former paper to urging the free and general resumption of the use of non-cohesive gold foil, the fundamental idea was to advocate the retention of all resources of known and proved value. Following that idea, attention was early drawn to amalgam, and examples of its great usefulness were cited, particular attention being called to a number of fillings made by Dr. Marvin; and it was specially pointed out that not the slightest trace of marginal inequality could be detected by the explorer. In the discussion it was stated that among a very large number of extracted teeth, a great many were found to contain amalgam fillings in a most deplorable condition; frequently large masses of the amalgam had been left overhanging the gingival margins, crowded against the gum, causing recession and loss of the teeth. It is patent to all that such a citation does not disclose the faintest scintilla of value as evidence. If someone were to state that many so-called inlays are merely ill-fitting globules of metal bedded in large masses of cement and projecting far beyond the cavity margins, no one would consider that statement very damaging testimony against the inlay. We are deeply interested in the thorough demonstration of all methods and in the skilful and conscientious use of all preparations; but the most glaring examples of wretched incompetence and inexcusable slovenliness can serve but to arouse our disgust, and call forth our heartiest condemnation. We were also told that the manipulation of amalgam is exceedingly difficult. Doubtless it does prove abundantly so to the average first-course student, who has had no practical training, but that it should prove so to a mature and experienced practitioner, highly skilled in the use of gold, is a trifle beyond the comprehension of your essayist.

DENTISTRY A LUXURY OF THE RICH?

Reference to the highly authoritative statement that "we have the poor with us always," which must cause a great demand for an efficient service which can be easily and cheaply rendered, evoked the rather startling announcement that operative dentistry is not for the poor, but that it is a luxury of the rich; that the poor cannot or will not pay the requisite fees for the proper finishing and polishing of amalgam fillings. Doubtless there are, in some of our large cities, a few practitioners whose time is so thoroughly occupied in the service of the wealthy that a really poor patient would prove a rare and unwelcome

visitor; but that is not the case with the rank and file of the profession, among whom patients of small and moderate means are the rule rather than the exception. And if the most exclusive of our colleagues would but note the example set them by some of the most noted of our distinguished relatives of the medical profession, they might realize that the poor have a claim upon some portion of their time and talents. Those who think otherwise should study the pledge required of the members of the recently formed American College of Surgeons:

In particular, I pledge myself to pursue the practice of surgery without self-restraint, and to place the welfare of my patients above all else; to seek counsel when in doubt of my own judgment, to render willing help to my colleagues, and to give freely of my services to the needy. Moreover, I pledge myself, so far as I am able, to avoid the sins of selfishness, to shun unwarranted publicity and commercialism as disgraceful to our profession, and to make my fees commensurate with the service rendered.

It has not been long since we were told, with evident satisfaction, of the marked progress made in Europe in providing municipal care for the teeth of the poor. Notable had been the progress achieved in Germany, where the paternalism of the government rendered its accomplishment especially feasible. It is true that we are not so thoroughly wedded to the idea of governmental paternalism in this country, still the free dental clinic is an established and growing institution.

QUESTIONABLE VIRTUE OF AMALGAM INLAYS.

In his former paper, your essayist referred to an account, of some years ago, of the filling of two large approximal cavities in molars, and, relying upon memory, stated that they had been filled with amalgam, also his belief that the fillings would continue to afford thorough protection of the teeth. In the discussion, however, it developed that, instead of amalgam fillings, amalgam inlays had been used, and the gentleman who made them expressed grave doubts as to their permanence. In the light of that correction, your essayist is forced to modify his optimistic prognosis, and he will further state that, in his individual opinion, an amalgam inlay is far-fetched and illogical, as he is at a loss to realize why anyone should abandon an operation which is easy, and which holds out bright promise of long service, in favor of something which is more difficult and confessedly so much more uncertain.

THE "HAVOC" WROUGHT BY AMALGAM FILLINGS CHARGEABLE TO INCOMPETENCE.

Though a very high tribute was paid to amalgam by one speaker, his statement that "just as dentists seized upon amalgam and wrought all this terrible havoc," does not appear consistent. On its face, that statement would make it appear that the havoc wrought was directly chargeable to bad qualities inherent in amalgam itself, whereas we know that it can be charged only to those who have so shamefully misused it; and if there had been no amalgam, it is quite certain that the same parties would have wrought equal, if not greater, havoc with something else.

IGNORANCE ABOUT NON-COHESIVE FOIL CONFESSED BY A TEXT-BOOK WRITER.

Early in the discussion a gentleman stated, frankly and generously, that he would at once expose the "rift" in his armor, and said, "I know nothing about non-cohesive foil, because I have never used a leaf of it." It seems hardly possible that he would have been so outspoken if he could have realized that what he termed a rift was, in reality, a fearful rent, which left him naked to the thrust of his adversary. Some years ago, a book was written on the subject of filling teeth. In it the author treats of non-cohesive gold foil, points out its defects and limitations, and positively asserts that it is bad practice to start fillings with it and finish them with cohesive gold, because there cannot be a

homogeneous union between the two preparations, and defective operations will result.

What are we to think when the author of a work, designed to be a text-book, discourses gravely about a long-familiar preparation, and publicly admits, years afterward, that he knows nothing whatever about it, and has never had the slightest experience in its use?

The discussion also furnished an example of that strange phenomenon occasionally noted, namely, that while a number of competent observers will be thoroughly in accord upon a given point, someone will express a radically opposite opinion.

DANGEROUS HERESY REGARDING THE PROBLEM OF IMMUNITY TO DENTAL CARIES.

Though the large approximal fillings submitted in illustration of your essayist's former paper were enthusiastically praised by some members present, as they had previously been by a number of practitioners, one of whom, a teacher of long experience, declared emphatically that "no man on earth" could possibly excel them; we were told that "There never was a more misleading impression produced upon the minds of people than in regard to this matter, viz, the length of time that certain fillings will preserve teeth, because the great majority of people between the ages of twenty and forty-five are immune to caries, and it makes no difference what kinds of fillings are inserted, unless they are inserted in such a way as to produce some unnatural conditions"—whatever that may mean—"they will preserve the teeth." In the opinion of that speaker, the gentleman who so kindly exhibited the fillings was one of those fortunate immunes—"so that the fillings shown here before the meeting mean nothing in regard to their saving qualities in these particular teeth." If that be true, then indeed are we upon the eve of a tremendous revolution. Some of our most firmly cherished ideas will be proved erroneous. Fillings which we have looked upon as miserable failures will often prove fully equal to those which we have regarded as the greatest masterpieces. The early predicted passing of the gold filling will indeed be realized, and not only that, but the inlay must soon follow it into oblivion, for who would trouble to make either, if it makes "no difference what kinds of fillings are inserted" for the great majority of our patients during so large a portion of their lives? Indeed, we have but to pursue that line of argument to its logical conclusion to see that we must soon face the probability of a greatly reduced demand for our services, for, if "the great majority of people between the ages of twenty and forty-five are immune to caries," they must ultimately conclude that the unfilled cavities in their teeth may, very generally, be expected to remain safely *in statu quo* for a quarter of a century.

In the very humble opinion of your essayist, no more misleading and highly dangerous doctrine could be promulgated among us. If we have learned one single fact about dental caries and its treatment, from what has come down to us from the ancient Egyptians and others and from the teachings of Miller and his contemporaries, it is that it is progressive from its inception, and that in its treatment we must rely absolutely upon the insertion of some substance into the cavities which shall tend to arrest the destructive process and prevent its recurrence, and that the longer its recurrence may be prevented, the more successful will be the treatment. Therefore the above-quoted statement strikes at the very foundation of our knowledge of operative dentistry. It is heresy so rank and unmistakable that, had a similar denial of the precepts of the Mosaic law been uttered prior to the present era, it would have insured the crucifixion of its author, while some centuries later, a like contradiction of the dogmas of Rome or the teachings of Calvin would have brought upon him the fate of Servetus.

DR. JENKINS' VIEWS ON THE ADVANTAGES OF TIN AND GOLD FILLINGS.

In a recently published paper, our distinguished colleague, Dr. N. S. Jen-

kins,* tells us of the great popularity in Europe of the filling made of tin and gold. Of it he says, in part, that it could be worked very rapidly, and successfully manipulated under moisture; though it discolored, it did not stain the teeth, did not "flow," or change its shape under the stress of mastication, while no filling surpassed it in permanence, and that he had frequently seen fillings made of it which were perfect after a service of from fifty to seventy years. Surely such a list of excellent properties would seem sufficient to entitle it to a worthy place in our daily practice, yet how many of us are making tin and gold fillings? Like non-cohesive gold foil, it seems to have become unfashionable, yet the nature of those foils has not changed in the least, and what was accomplished with them fifty years ago can as readily be accomplished today. Civilized man, the world over, wears clothes and shoes, and while the cut and color vary with the changing fashions, he still uses cloth for the one and leather for the other.

ADVANTAGES OF THE PORCELAIN INLAY.

Dr. Jenkins also tells us that the porcelain inlay is extensively used in Europe, where many practitioners have become exceedingly expert in its manipulation, and he deplores the fact that its suddenly acquired popularity in this country was not maintained. In accounting for that fact, he points out that we have not shown that degree of zeal and persistence in acquiring a thorough mastery of its technique which has characterized the efforts of so many of our brethren on the other side of the Atlantic. That is not as it should be. The American dentist long enjoyed a great popularity throughout the civilized world, chiefly because of his marked technical ability, so it clearly behooves us to bestir ourselves, lest we be forced to cede much of our prestige to our highly accomplished, zealous, and enthusiastic European colleagues.

Further, Dr. Jenkins calls attention to the fact that, in more than one important particular, porcelain is superior to gold in inlays. Not only is it so because of its obvious lack of what he so aptly terms "the disharmony of gold," but also because porcelain inlays are much more readily tolerated in sensitive cavities. Two such important points of superiority cannot fail to claim our attention, and there is little doubt that we shall soon find ourselves forced to devote renewed and serious study to the porcelain inlay.

DURABILITY OF GOLD INLAYS DEPENDENT UPON CEMENT.

Just here some thought may be appropriately given to the broad question of the relative merits of the filling built directly into the cavity where it is intended to remain, and the inlay made outside of the cavity and cemented into the space which it is designed to occupy, for upon the ultimate determination of that question must rest either the fulfilment or the failure of our recently predicted revolution.

In legal practice, competent and reliable testimony must be accepted in determining a question. All will concede that, as a witness for the inlay, Dr. Conzett is both competent and reliable. After his glowing tribute to the gold foil filling quoted in your essayist's former paper, he goes on to state that, in spite of its great excellence, gold has long proved a most intractable material in the hands of a vast number of practitioners—"therefore the profession hailed with delight the advent of the inlay." Clearly, their delight resulted not alone from the realization that its technique is easier, but also because it affords a ready means of escape from the early discoverable failures of so many gold fillings. On that point, Dr. Conzett tells us that, though a good gold filling cannot be surpassed, a poor one is the worst filling imaginable, and later he says—"The poorest inlay will prove vastly superior to a moderately defective gold filling," but in a more recent paper he says—"The gold inlay is now beginning to bring forth a large crop of

* "The Perfect Porcelain Inlay." By N. S. Jenkins, DENTAL COSMOS, July 1913, p. 711.

failures. The cement which has hitherto served to protect the cavity walls has had time enough to be dissolved out, and the inlays are failing in large numbers." And though he attempts to account for those losses on the ground of improper cavity formation and "failure to so shape the inlays that the force of mastication should tend to drive them more firmly into the cavities instead of tending to force them out," he does not tell us—because no man can tell us—that it will not be seen, in a vast number of instances, that the cement "has had time enough to be dissolved out" from around the most firmly seated inlays in the very best formed cavities.

As it is shown that the inlays were safely retained in the improperly formed cavities, so long as the cement remained unaffected by the oral secretions, how can we argue that a different shaping of the cavities would have sufficed to prevent its dissolution?

UNRELIABILITY OF CEMENT.

In order to shed further light upon this point, let us summon additional expert testimony, namely, that of the prophet of our new revolution himself. In a paper, after describing in detail the various steps involved in making an inlay, he says, in substance: "The inlay is now complete, and, when pushed into the cavity, it will be found to fill the space perfectly and to fully restore the contour, yet something will still be needed; it must be cemented into place, for without the cement the oral secretion will at once effect an entrance, the process of decay will be resumed, and the most perfectly fitted inlay will prove a failure." Therefore we see that, for the ultimate success of the inlay, we are forced to rely absolutely upon a preparation which all experience has proved to be notoriously unreliable. We are abundantly familiar with the uncertainties of cement. In the teeth of some persons it proves wonderfully durable, in many exactly the reverse. A striking illustration is furnished by two daughters of a very distinguished member of the profession. For the younger daughter cement fillings, representing various brands, have always rendered splendid service, the fillings becoming exceedingly hard and showing remarkable durability, while for the elder daughter the most carefully made cement fillings which her distinguished father could produce never endured more than a few months. Obviously, inlays would prove markedly satisfactory for the one sister, most unsatisfactory for the other.

As pointed out by Dr. Faught, in his able discussion of your essayist's former paper—"The inlay has not been proved . . . . It is as weak as the weakest link in the chain, the cement." Nothing can be stronger than its weakest part. When the deacon who is immortalized in verse decided to build the "Wonderful One-Hoss Shay," the problem confronting him was summarized in these words:

"Now in building of chaises, I'll tell you what—
There is always somewhere the weakes' spot;
Above or below, or within or without,
And that's the reason, beyond a doubt,
What a chaise breaks down, but doesn't wear out.

But the deacon, having studied his problem carefully, announced his theory for its solution thus:

"It should be so built that it *couldn't* break down,
Fur," said the deacon, "it's mighty plain
That the weakes' place must stan' the strain;
So the way t' make it, uz I maintain,
Is only jest t' make *that* uz strong uz the rest."

And how thoroughly he demonstrated the soundness of his reasoning is duly set forth in the poem.

But in treating dental caries we are forced to reckon with other problems besides those which are purely mechanical. We have material abundantly strong and durable for the body of the inlay; our difficulty lies with the cementing substance, and until we advance much beyond our present status, many must continue to regard the cemented margins of their inlays with apprehension.

In announcing that prophecy—which to many appears more weirdsome than

probable—the author says: "Any child would tell us teeth are made to eat with"; but any child would also tell us that their usefulness for that purpose would cease if they be lost. The Bible propounds the inquiry—"What shall it profit a man, if he gain the whole world, and lose his own soul?" And without irreverence or undue levity, we may paraphrase that inquiry and ask, "What shall it profit our patient, if we restore the occlusion to the utmost perfection, and our efforts to preserve the teeth prove unavailing?" Few among us have made occlusion the subject of such profound and comprehensive study as did the late Dr. Bonwill, and few indeed have left behind them such splendid monuments of extensive and successful restoration, and though he realized fully that his restorations fell some trifle short of perfection in the thorough reproduction of the forms of missing occlusal areas, he died firm in the faith that they thoroughly fulfilled all practical requirements in that direction. And when we look upon those masterpieces and see them perfect, after a quarter or a third of a century of service, it is difficult indeed to escape the conviction that he did vastly better in making fillings which have demonstrated a full hundred per cent. of efficiency in tooth preservation, with a possible lack of five or ten per cent. in the thorough restoration of the occlusal surfaces, than if he had restored those surfaces to the finest detail of ideal perfection, and achieved but five or ten per cent. of preservation.

RELATIVE INTRACTABILITY OF COHESIVE GOLD FOIL.

In his confession of faith, the prophet of our newly predicted revolution says—"Thus cohesive foil will be superseded by the inlay, just as it took the place of soft foil." Cohesive gold has, unquestionably, long since taken the place of non-cohesive foil in the practice of a vast number of the profession. For many years, it has enjoyed the almost undisputed right of way along the path of popularity; but, though that pathway has been marked by numberless magnificent monuments to its successful employment, it has led through a veritable charnel-house of most disastrous failures.

As pointed out by Dr. Conzett—for he surely refers to cohesive gold—it has long proved a most intractable material in the hands of a vast number of practitioners. So intractable is it, indeed, so exacting are the requirements of its technique, so resentful is it of the slightest inaccuracy of manipulation, and so difficult is it to secure its thorough adaptation to every part of the less accessible cavities, that it has long been a stumbling-block to a great number of the profession; still it has had a great run of popularity. Among the reasons which serve to account for that popularity, the contoured cohesive gold filling, despite its "disharmony" as pointed out by Dr. Jenkins, has long been considered a beautiful operation, but many of those who have clung to it so persistently, have found themselves in a situation aptly illustrated by an anecdote which your essayist's father was fond of narrating. The eminent English surgeon, Sir Astley Cooper, was conversing with a distinguished colleague from France about an operation then regarded as exceedingly difficult and dangerous, and Sir Astley stated that he had performed it only a very few times; but the Frenchman replied, with enthusiasm: "Ah, Monsieur le Docteur, but I haf performed zat operation more than one hundred times." Questioned as to the results, he admitted, with a characteristic air of deprecation, "Yes, unhappily, ze patients all died; but it is one beautiful operation." So it has long been with many of our colleagues, the fillings were beautiful; but the teeth, unhappily, were soon lost.

THE PRESERVATIVE PROPERTIES OF NON-COHESIVE GOLD FOIL, VERSUS THE DESTRUCTIVE GOLD INLAY.

How different would have been the results, in an immense number of instances, if they could but have remembered the easy adaptability and the wonderful preservative properties of the old-time "soft" or non-cohesive foil. With it, either alone or in judicious combination

with the cohesive preparations, which when *appropriately* and skilfully used will prove fully as reliable, an incalculable number of those dismal failures would have resulted in most gratifying successes, which would have substantially equaled in practical results, if not quite in some other particulars, the splendid masterpieces of Webb and of Bonwill, and those which your essayist recently had the honor of submitting for your inspection. In a vast number of approximal cavities of bicuspids and molars, now wholly given over to the inlay, we could secure thoroughly sound walls, well defined margins, and ample extension for prevention by the removal of such limited portions of the occlusal surfaces that their minute form restoration would prove a matter of no practical moment whatever, while the "wholesale and heroic"—might we not almost better say barbaric?—cutting away of sound tissue so commonly necessary for the inlay involves the sacrifice of a vastly wider occlusal area, and calls for a correspondingly extensive restoration. There is an abundantly wide field for the inlay in those cases where the loss of tissue has already been so great that the really necessary cutting affords ample space for all required manipulations, and, if it should ultimately effect nothing further than to cause an appreciable curtailment of the too free use of the gold shell crown, it will accomplish a grand work, which will entitle it to our lasting regard.

THE QUESTION OF FEES AS RELATED TO THE GOLD INLAY.

Another danger threatens in this connection, which merits the attention of us all, more especially the younger members of the profession. There is not the slightest doubt that many have been attracted to the inlay, not alone because of the facility which it offers for escaping the early discoverable failures of improperly made gold fillings, but also because it commands a larger fee. In the report of a discussion, someone was credited with the statement that he had never made so much money from his practice, or made it so easily, as he had by employing a number of assistants and keeping them busy making gold inlays. That course must certainly have served to bring in a decidedly increased revenue; but that the patients who provided the increase all derived benefits commensurate with their outlay is not so certain. Factory methods have never met with favor among the real leaders of the profession. Where an inlay is obviously indicated, we should not hesitate to use it; but we should not recommend it, even to our wealthiest patient, when our judgment points strongly to the belief that we would accomplish more valuable service with the simpler and less expensive filling, no matter whether of gold, of tin and gold, or of the homely and much-berated amalgam. In short, we should not recommend to others any service which we would not freely accept, under like conditions, for ourselves, or render for our own children; for he who does otherwise for the sake of added gain, no matter how great his skill or how wide his popularity, is treading dangerously near to the borderland of charlatanism.

ACHIEVEMENT GREATER THAN ACCUMULATION.

Unfortunately, despite the heavy demands which it makes upon our physical and nervous resources, ours is not a particularly lucrative occupation. We cannot equal the earning of a famous surgeon or a leader of the bar, and cannot remotely approach the immense accumulations of the merchant princes, the captains of industry, or of those bold and spectacular gamblers called "wizards of finance," but, having chosen our calling, we should patiently reconcile ourselves to its financial limitations, or seek some other employment. So long as we continue its practice, we should ever keep it clearly before us that the heaviest obligation which it lays upon us is a scrupulous regard for the welfare of those who seek our services relying upon our professional integrity, and no matter at what cost of immediate pecuniary ad-

vantage, we should ever strive to render such services as will be of the utmost ultimate value to our patrons.

To encourage us in an adherence to that course, we have an abundance of most brilliant examples. The pages of history are resplendent with the records of those who rated achievement higher than accumulation, whom considerations of expediency could not turn aside from the straight and narrow path of duty, while, on the other hand, there is no lack of evidence to prove that an undue craving for gain has ever tended to dim the luster of genius. One of Rome's earlier rulers, though already very rich, made war upon a neighboring people who possessed vast wealth, of which he intended to despoil them; but he was utterly defeated and killed in battle, and in derision of his insatiable avarice, the victors poured melted gold down the throat of the corpse. The First Napoleon was a great military genius, also a very keen and capable judge of character, and he surrounded himself with an exceedingly able body of assistants. Among his marshals there was not one who surpassed Masséna in indomitable courage, in utter indifference to danger, and in ability to remain calm and undisturbed amid scenes of carnage and impending disaster. But his usefulness was sadly hampered by an inordinate craving for money; he was constantly stealing from the military chest, and his great commander is on record as saying that he would gladly have made him a present of the equivalent of a million dollars, had he not realized that even so generous an endownment would not have sufficed to put a stop to his continual peculations.

In pleasing contrast, in reply to those who told him that his scientific attainments and his worldwide researches could readily be made to yield him an immense fortune, Baron Humboldt said that he had no time to devote to such a purpose. In old age and blindness, Milton dictated his immortal poem to his faithful daughter. On his deathbed, Brunelleschi became so filled with the realization of the splendor and beauty of the great dome surmounting the cathedral which, through his genius, had been raised to the glory of God and the honor of his time and country, that he exclaimed, almost with his last breath: "May the dome of heaven be my reward!" And when his yet more versatile colleague, Michel Angelo, was asked to draw plans for the still grander temple of St. Peter's, he first journeyed up to Florence to study the masterpiece of his illustrious predecessor, and, having concluded his studies, he said: "We will build thy sister a little larger, but not more beautiful." During our short but brilliant existence we have had our heroes, our geniuses, our enthusiasts, who were not deterred by sacrifices from the attainment of their high ideals.

THE "HIGHER REWARD."

If we had had no Maynard, Dwinelle, Gunning, Webb, Varney, Cushing, Bonwill, Harris, Perry, we would lack much of our prestige, and would have suffered in our material welfare, and though some will tell us that the day of the enthusiast has passed, that the idealist is out of place in this bustling and intensely practical age, such is not really the case, for there are among us and all around us those who are still warmed by the true fire of genius, who count little of sacrifices in the attainment of their lofty ideals. When your essayist first enjoyed the privilege of appearing before you, there was in the audience a gentleman who is neither a member of our profession nor a citizen of our country. An invitation was asked for him upon the ground that, when a man who is a foreigner and a member of an entirely different profession showed a willingness to make a journey of two hundred miles to listen to a paper which many of our colleagues would not travel a single mile to hear, he was worthy of recognition. Naturally, the invitation was promptly and cordially extended. That gentleman is a musician of the highest attainments, but having devoted his life to teaching, he lacks the worldwide renown and the wealth of some of his famous colleagues who have enjoyed the financial backing and the tremendous advertising of great instrument makers like the Steinways. He once said in private con-

versation—"Though I shall not succeed in making a great fortune, I still shall not feel that my life has been a failure, and for the ability to realize that fact I thank my old father, who is in his grave." The "old father" was also a professional man, a clergyman; like the son, he had but a very modest competence, but he died greatly beloved and widely respected, and he worthily wore two royal decorations, conferred upon him by his sovereign, the official head of the church which he served so long and so faithfully.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

WHEN DENTISTRY GOES TO LAW.

By WILLIAM E. SANDMEYER, Esq., Newark, N. J.,
MEMBER OF THE NEW JERSEY BAR.

SOME years ago, a young dentist, finding practice dull at first, employed his leisure in reviewing the several branches of his profession with an eye to selecting a specialty. He did not go far in this fashion, however, before he caught an idea. This had to do with a new method of constructing sets of artificial teeth.

In the course of time he tried his invention upon an old lady, one of his patients. Flushed with pride at their appearance, he told her, in confidence, that he had "outstepped the rest of his profession," and that her teeth were positively a new departure. It is evident that he never considered the law, or he might have been careful. However, he found reason to consider it—for within a year he received a very short letter from a lawyer, from which he gathered that he was expected to pay for the damage his "new departure" had inflicted upon the old lady.

He was indignant, and wrote the lawyer to that effect. In the course of time, however, he learned that he might better have settled the case. A judgment against him was obtained, the newspapers gave him plenty of undesirable notice, and eventually he was forced to abandon his dwindling practice.

A little knowledge is dangerous in some instances; in others the lack of it is quite as dangerous. If this young man had known that the law does not countenance experiments, he might now be reaping the fruits of his inventiveness. So it may be of interest as well as of profit for one to look into these time-worn legal doctrines surrounding one's profession. Then if he should desire to try a new invention upon an old and unsuspecting lady, he will, perhaps, have the forethought to make a special contract.

THE LAW REGARDING ORDINARY AND SPECIAL SKILL.

A dentist is not supposed to possess the highest degree of skill possible, but only that degree of skill and learning ordinarily possessed and exercised by the members of his profession of the same grade, in good standing, and practicing in similar localities. But it is always his duty to use reasonable care and diligence in the exercise of his skill and the application of his learning, and to act in accordance with his best judgment.

Naturally, more is required of one representing himself to be a specialist. He holds himself out as one having special knowledge or skill in particular divisions of his profession, and he is bound to bring to the discharge of his duties, when employed as such specialist, not only that ordinary degree of skill and learning, but special and unusual skill and learning such as is possessed by men who are specialists in that line.

It is the ambiguity of these rules that helps a lawyer earn his daily bread. Yet it would be impossible to draw the lines any more closely. Whether or not a man comes up to the requirements of the law, whether or not he has used reasonable care and diligence in the application of his learning, and such other questions, are issues which must be decided upon the facts in each case.

LIABILITY.

A dentist is bound by what is universally settled in his profession. It has been broadly stated that a deviation from the established mode of practice, when damage results, is sufficient to charge the dentist with liability. And conversely, where the established mode of practice is adhered to, and no gross error is shown, the dentist cannot be held for any injury resulting, nor is he liable for want of success. Even a Christian Science healer must not deviate from the usual practice of that school. If a patient, however, cannot endure the ordinary and prevailing treatment, the doctor is not negligent if he deviates.

A woman, suffering a severe attack of an unusual disease of the teeth, went, naturally, to the family dentist. He failed to relieve her, though she continued his treatment for eighteen months. She then went to a specialist. He informed her that at that stage of the disease, nothing would save her teeth, but had she received proper treatment from the beginning the progress of the disorder could have been checked very quickly. Thereupon she sued her family dentist.

The court held, in effect—"That a dentist is not required to exercise care and skill proportionate to the character of the injury or disease he treats, and he is not liable if he does not treat a severe case with such skill as its severity seems reasonably to demand."

This is entirely compatible with the foregoing rules. One in ordinary practice is never required to exercise more than ordinary skill and learning.

The fact that a dentist performs his services without compensation does not absolve him from his duties and liabilities. A free-clinic patient has the same standing in the courts as the elderly lady, who so ingeniously bore that "new departure" about in her mouth. However, let the distinction be well noted; in the absence of a special contract, a dentist is never liable for want of success, if he has complied with his legal obligations.

SPECIAL CONTRACTS.

One dentist, however, inserted in a receipted bill given for the price for a set of teeth, the words—"Warranted for one year; and if on trial they cannot be made useful, the teeth to be returned and the money will be cheerfully refunded." When this receipt came before the court, it was held that these words constituted a special contract making the dentist liable for want of success.

This dentist was an unusual fellow, and a digression in order to follow the course of his difficulties may be pardoned. He was determined not to pay the judgment recovered against him. He had no assets except his office equipment. The sheriff levied on that, but the dentist interposed the defence that all the fixtures in his office were the "tools of his trade," therefore exempted by the statutes. However his ingenuity availed him nothing. The court held that dentistry is not a trade, and that a dentist is certainly not a mechanic, however much belief there may be to the contrary.

A dentist is required to use reasonable skill and knowledge in diagnosing the condition of a patient. The very highest professional skill is required of the dentist when he uses an anesthetic. However, he is bound to look only to the natural and probable effects.

LIABILITY OF UNLICENSED PRACTITIONER.

A clever dental student, having failed to pass the required examinations, decided it was a waste of time to further prepare for them. So he went to a small town and engaged in the practice of dentistry. Through his carelessness, one patient was badly injured and contracted a distressing disease from the injury. When the patient brought suit, the young man defended himself by setting up the

fact that he had never qualified to practice, and therefore was not bound by the rules commonly applicable to that profession. The court told him, that, since he had been holding himself out as a dentist to people employing him, and causing them to believe it, he was chargeable as such.

LIABILITY FOR NEGLIGENCE.

It is the duty of a dentist not to spread contagious diseases, and he must use the utmost care to avoid it.

The unwarranted abandonment of a case at a critical period, resulting in increased pain and suffering on the part of the patient, will render the attending dentist liable in damages. Or if an injury requires frequent attention, and the dentist fails to attend as he should, he will be held accountable. One is not required to take a case, even though no other doctor is available, and one may abandon a case at any time, provided he serves notice of his intention and gives the patient ample opportunity to secure the services of another doctor.

One petulant young dentist had a rather stormy experience working on an old man. In fact, the crabbed old man so annoyed the dentist that he finished his work as quickly as he could, and got rid of the patient. However, the old man persisted in coming back to complain about the "job," as he termed it, and not until the old man was roughly turned away did the young dentist again know peace of mind. This truce was short-lived; the old crank began a lawsuit. The bewildered dentist proved that his treatment of the case was proper, and in accord with the best practice. The old fellow proved, however, that the dentist, in his haste, failed to give proper instructions, and that damage resulted. The court held that failure to properly instruct a patient as to his conduct constitutes negligence, and any damage resulting therefrom must be borne by the one at fault.

MISTAKES OF JUDGMENT.

An honest mistake of judgment in determining the nature of a disease, its treatment, and such other points, will not ordinarily render a dentist responsible for damages. Still he must be entitled to practice, possess the requisite qualifications, and, above all, must apply his skill and learning with great care. Where there is a reasonable doubt as to the nature of the physical conditions involved, or what should be done in accordance with the recognized authorities and current practice, an honest mistake is even more excusable at law. Yet the slightest omission or neglect will serve to change the entire status, and the dentist will become chargeable. In some jurisdictions, doctors have been held responsible for merely not keeping abreast with the times.

BREACH OF DUTY.

A doctor must act with the utmost good faith. If he knows he cannot accomplish a cure of his patient's ailments, or that the treatment adopted will be of no benefit, it is his duty to advise his patient of these facts. If he fails in this, he is guilty of a breach of duty.

Contributory negligence on the part of the patient will bar a suit by him for damages resulting therefrom. And when the patient knows of a lack of skill and learning on the part of a dentist, and he continues treatment with that dentist, the patient is precluded from complaining, if that constitutes his whole ground of complaint.

LIABILITY FOR ASSISTANT'S ACTS.

A dentist is always liable for the acts of his assistant; the liability is joint or several. In other words, the dentist may be charged for all or only a part of the damage inflicted.

COMMON LAW RULE FOR LIABILITY.

It is well to sum up this discussion of the liabilities of the dentist by quoting the old common-law rule. Blackstone (Book III, chap. VIII) states it in this manner: "Injuries affecting a man's health are where, by any unwholesome practice of another, a man sustains

any apparent damage in his vigor or constitution. As by selling him bad provisions or wine; by the exercise of a noisome trade, which infects the air in his neighborhood; or by the neglect or unskilful management of his physician, or his surgeon, or apothecary. For it hath been solemnly resolved that *mala praxis* is a great misdemeanor and offense at common law, whether it be for curiosity and experiment, or by neglect, because it breaks the trust which the party has placed in his physician, and tends to his destruction." Upon this is based the modern law applicable to the profession of dentistry.

COMPENSATION.

Not the least interesting question in professional life is that of compensation. One may have higher ideals than merely the desire to wax prosperous, but one must earn money to sustain even such flimsy things as ideals.

Years ago, in England, it was otherwise considered. At common law, a doctor had no remedy to recover a remuneration for services. He was presumed to act with a view only to an honorary reward. In order to get so much as his expenses the doctor had to make a special contract to that end. At a very early date the courts of the United States abolished this rule.

The employment of a doctor without any definite agreement as to compensation raises an implied agreement on the part of the employer to pay what the services are reasonably worth. It follows naturally that one also may collect the reasonable worth of the services of an assistant.

COLLECTION OF BILLS.

It often happens that one, sympathizing with a patient, will send him a bill for much less than the value of the work. If the dentist is subsequently forced to sue that patient, he often desires to sue for the true value of his services—the belief being common that one is bound by the bill he sends. This is not the case; one may go into the court and sue, on the *quantum meruit* count, for the reasonable value of one's services, and recover therefor, regardless of the bill rendered.

One not qualified to practice dentistry cannot recover fees in that capacity. When a statute has for its manifest purpose the promotion of some public policy, and prohibits the carrying-on of a profession except when certain terms are complied with, a contract made in violation thereof cannot be enforced.

In the absence of an express agreement, the right of a dentist to recover his fee does not depend upon the beneficial results of his attendance, but upon the diligent exercise of his skill and learning. Such services are regarded as beneficial, in a legal sense, and right to adequate compensation arises upon their rendition.

The limits of space prevent my going farther in this interesting field. Certainly it is well settled that a dentist is entitled to compensation, and one may rest assured that, when a patient has any money, one can generally make a collection. But an action at law is costly as well as distasteful, and it is not well to be known as a man who readily goes to court. Therefore the other means of collection should be made the subject of most careful study.

In collecting a bill, one wishes, in the first place, to get the money to which he considers himself entitled. In the second place, one desires to retain the patient's good-will. Very often the good-will is sacrificed to the money, and, if the collector loses his temper, he frequently loses the money as well. It is a question whether or not, in the long run, good-will is not a better business asset than money. It certainly seems reasonable to say that a letter which engenders respect is more likely to collect an account than a demand or a threat.

The last thing a collection letter should carry is a threat. Nothing does so much to challenge a person's stubbornness; nothing is less successful.

When an account gets beyond a doctor's personal attention, and he desires to turn it over to a commercial agency or to a lawyer, he should use the utmost care in his selection. If a doctor thinks

anything of his practice, not only should he take wise care of his collections, but he also should see to it that his agency or attorney does not offset his pains. These *small* things are of the highest importance, yet they often are the subjects of gross negligence. Many times, a well-considered letter will bring a check that no legal process ever invented can dislodge, and at the same time it will throw the writer into greater respect.

And lastly, let it be said that every case must rest upon its own peculiar set of facts. There has never been written a "form letter" that would cover, adequately, more than one case. An agency which uses "forms" is worse than no collection. If you are too busy to write a collection letter, do not send any letter! If your collection agency is too busy to take up your matter as an independent case, you had better take the account away with you! In the last analysis it is work that one needs, and one insulted, or frightened, or dissatisfied patient will do all that he can to keep a hundred other patients away from that particular doctor's office.

CONCERNING THE ETIOLOGY OF DENTAL CARIES.

By C. F. BÖDECKER, D.D.S., Berlin, Germany.

(Read before the W. D. Miller Dental Club of Berlin, November 1, 1913.)

Dr. J. Sim Wallace of London published a book, now in its second edition, on "The Prevention of Dental Caries," a subject of undoubtedly universal interest.

"PAPPY" FOOD AS A CAUSATIVE FACTOR OF CARIES.

The principal thought set forth is that caries is caused by the "pappy" consistence of the food now eaten by the civilized races of the world. He claims that if we would eat food of a more fibrous nature, or at least finish our meals with such food, the teeth would be cleansed of adhering particles, and decay would not take place. He advises that raw fruit be eaten after every meal, the apple being the best, as it requires thorough mastication.

About this there is no doubt, for it has been the belief of most dentists that through lack of use teeth deteriorate, and therefore decay more easily. If man would eat his food in an uncooked state, as was intended by nature, the thorough mastication needed would automatically keep the teeth spotlessly clean, and he would not have the slightest need of a tooth-brush. But our digestion would now protest against raw food, so that we have to resort to artificial cleansing and massage of teeth and gums. We have all heard the war-cry of Dr. Cunningham, "Clean teeth do not decay," and although this is not true in all cases, we had best let the public think so—for if the masses were given the idea that there is some doubt about this claim, they might neglect the tooth-brush as a useless expense and inconvenience, and their teeth would undoubtedly suffer.

W. D. MILLER'S WORK ON CARIES UNJUSTLY DISCREDITED.

Dr. Wallace expresses in his book the opinion that W. D. Miller did not discover the cause of caries, an opinion which seems to be shared by a number of our English colleagues.

I can do no better than repeat two quotations which Dr. Wallace cites to prove that the cause of caries was unknown up to the present:

There seemed to be a general belief, at any rate among those practicing dentistry, that the cause of caries had been found, and the fact seemed to be lost sight of that all that Dr. Miller had done was to demonstrate the phenomena of caries, and although his researches had shown the channels in which further investigation should be pursued, the actual cause of caries was still unknown, and is to the present day unknown. (Leading article, published in the *Lancet*, October 21, 1905.)

The second quotation is taken from Stanley P. Mummery, "Heredity and Dental Diseases," proceedings of the Royal Society of Medicine, 1908, p. 108:

It is frequently stated that the true cause of dental caries has yet to be discovered, and although we know the pathology of the disease through the investigations of Dr. Miller, the etiology is a very different matter.

Another part of the quotation from the *Lancet* reads as follows:

If we wish to deal with dental disease. we must first of all possess a correct knowledge of its cause. Do we possess that knowledge? It is now more than fifteen years since Dr. W. D. Miller's excellent work on the "Micro-organisms of the Mouth" appeared, in which he clearly demonstrated that caries of the teeth was due to the abstraction of the lime salts by acid, followed by the peptonizing action of bacteria, the acids being formed from the fermentation of carbohydrate food.

DR. WALLACE'S ALLEGED DISCOVERY REGARDING THE ETIOLOGY OF CARIES.

On the next page (page 27) Dr. Wallace gives us his version, printed in italics, of the true cause of caries:

The cause of caries is the prolonged retention or stagnation of fermentable carbohydrates in more or less immediate contact with the teeth, and undisturbed by the free access of saliva.

Can anyone read the above passages and still claim that W. D. Miller did not discover the cause of caries?—for there is no difference between what Miller is quoted as having accomplished and Wallace's definition. The latter is worded more simply, while Miller used scientific terms. Dr. Wallace has confused the terms *exciting* and *predisposing* causes of caries, which come under the head of etiology. If we take pneumonia, for example, the predisposing causes are alcoholism, exposure, typhoid, gastro-intestinal diseases, etc., whereas the exciting cause is the diplococcus pneumoniæ. Yet we find this germ in the throat of almost every person, even though he be healthy, which proves that unless the predisposing cause is present, the diplococcus pneumoniæ will do no harm. This is analogous to the phenomena of caries. In this disease the exciting cause is the formation of acid through the action of bacteria upon carbohydrate food, and there can be no doubt that W. D. Miller discovered this fact. But very little attention has been given to the predisposing causes of caries. Irregularities, causing food to lodge easily between the teeth, may be a predisposing cause, but the principal one is to be sought in the tooth tissues themselves. To this question I will return later.

THE PROBLEM OF SUSCEPTIBILITY AND IMMUNITY.

As the writer in the *Lancet* did not accept Miller's theory as to the cause of caries, it is to be doubted whether he will consider Dr. Wallace's ideas as being nearer the truth. For the two are the same. If previous to Dr. Wallace's book it had been unknown that, usually, ill-cleaned teeth decay easily, why have strenuous attempts been made to remove all traces of food from the teeth by means of tooth-brush and floss silk? Every student for the last decade has heard throughout his college training that wherever food lodges for any length of time, decay will take place. This is true from the theoretical aspect, but regarded from the clinical point of view—does decay *always* take place where food lodges? It does not! For this reason, the writer in the *Lancet* says that the actual cause of caries is still unknown. (Presumably he means the predisposing cause.) Fermentable carbohydrates often cause caries, but every practitioner has seen extensive approxi-

mal caries on one molar or bicuspid, whereas the adjoining tooth was still in a healthy condition. There must still be some factor missing to explain this immunity.

This brings us to susceptibility and immunity to caries. We will first consider this in the general sense in cases where one mouth seems to be immune, while another is totally wrecked by caries. This difference may be explained in part, but in part only, by the difference in diet as mentioned in Dr. Wallace's book. There is no doubt that some owe their carious teeth to filth, whereas there are other mouths, also excessively filthy, that are showing no trace of caries. Dr. Wallace accounts for this phenomenon through an incorrect diet or only an incorrect sequence of food. The patient should finish each and every meal with detergent foodstuffs, such as apples. If the only cause of caries were the lodging of foodstuffs on the teeth, there is no doubt that, by the correct choice of diet, carious teeth would become unknown. Dr. Wallace remarks:

> Susceptibility and immunity, in regard to dental caries, is, if not a misconception altogether, at least an almost negligible factor, which, at the present day throws no light whatever on the means at our disposal for preventing the disease.

Susceptibility has become with many a negligible factor, because it has been difficult to find radical histological differences in the teeth of patients susceptible and those immune to caries. Yet it is only by the study of the predisposing causes of caries that means will be found for combating this scourge.

THE RÔLE OF THE ENAMEL: "HARD" AND "SOFT" TEETH.

In connection with this question, the histology of the enamel of the teeth plays the greatest rôle, for after that structure has succumbed to caries, the dentin offers but little resistance. Teeth were at one time divided into "hard" and "soft" teeth—that is, the hard ones were those immune to caries, while the soft ones were regarded as prone to decay. This classification was attacked and apparently refuted by innumerable histologists, so that no one dares to mention it. Yet almost every practitioner has the feeling that many of the teeth of patients prone to acute caries are decidedly softer than others. Black states that in the excavation of a carious cavity the enamel is found to be also carious, and therefore softened through partial decalcification. That is true, but when we extend the cavity margins, according to the teachings of Black, beyond the contact point to prevent secondary caries, we have an excellent opportunity for testing the hardness of the healthy enamel. And there we still find hard or soft enamel, as the case may be. A second point in favor of the theory that hard and soft teeth exist is the possibility of soft teeth becoming hard again after the body has recovered from some constitutional ailment. This fact is denied by most histologists, yet every practitioner has seen white spots in the enamel, such as are sometimes found in the teeth of pregnant women, disappear. A third point in favor of the above theory is the fact that orthodontists massage white spots in the enamel that are sometimes caused by regulating appliances. If these white spots had no possibility of recovering, what good could be expected from massage? If it were to remove the decalcified enamel, why not excavate thoroughly and place a filling? Because the vitality of the enamel has been doubted is the reason why the histologists have not admitted that circulation exists. That is the crucial point, for without circulation the enamel could not change, except for the worse through caries. It has been my good fortune, after eleven years of work, to be the first to prove the presence of organic matter in the enamel. And it is this organic matter through which slight circulation takes place.

IMMUNITY DUE TO STRUCTURE OF THE ENAMEL.

I would like to discuss one point more, and that is the local immunity to caries of a tooth the neighbor of which shows

a large cavity. This immunity of the intact tooth cannot be explained by claiming that the lactic acid formed from food deposits could not act upon it. The food is wedged between the two teeth, and the acid-forming bacteria attack it from all sides; thus both teeth are under the influence of the acid, and both should decay with equal rapidity. The fact that they do not, irrefutably proves that some teeth are more resistant to decay than others. Some authors ascribe this immunity to the action of the saliva, but in these cases of local immunity, which we see most every day, not even the saliva can have this beneficial effect. *Nothing but a difference in the structure of the enamel can explain immunity to caries.*

Dr. Wallace is so optimistic as to the beneficial effect upon the teeth from the use of detergent foods after each meal, that he says (page 2) we shall hear of—

> the decimation of the ranks of the dentists, which will follow when once the eyes of the public are opened to this scourge and its possibilities of prevention.

There can be no doubt that Dr. Wallace's book has filled a long-felt want in dental literature, for it emphasizes the fact that most people do not give proper attention to the care of their teeth, and it tells them that, on making the correct choice of foods, the teeth will be cleansed through mastication.

THE THERAPEUTIC ACTION OF POTASSIUM SULFOCYANATE IN DENTAL CARIES.

By THEO. VON BEUST, D.D.S., M.D., Dresden.

IT was at about the beginning of the nineteenth century that Treviranus discovered that the addition of dilute solution of ferric chlorid to the saliva would bring forth a red color. For some years the nature of the ingredient which was responsible for this reaction was declared by analyzing chemists to be potassium sulfocyanate. Some decades later dental investigators expressed the belief that this constituent of the saliva was instrumental in the prevention of the development of fungi, and inhibited the decomposition of matter.

HISTORY OF POTASSIUM SULFOCYANATE INVESTIGATIONS.

It was not, however, until J. P. Michaels of Paris delivered his address upon "Sialo-Semeiology" before Section II of the Third International Congress, in 1900, that potassium sulfocyanate received more than meager attention. Michaels demonstrated on this occasion the existence of a biochemical relation between the tissues of the body, and emphasized the importance of a systematic examination of the saliva in such a convincing and masterly manner that this class of work at once became a valuable aid in dental diagnosis. Michaels pointed out that when sulfocyanates are present in certain proportions we can expect to find a condition of immunity to caries.

After a stimulus had thus been given, prominent investigators, among whom we find Miller, Kirk, Hugenschmidt, Pickerill, and Bunting, made a special study of the biological properties of the saliva. These examinations have not yet satisfactorily explained the manner of action of the substance considered here, but many have given testimony to its therapeutic value, so that today it has

won an important place in the practice of prophylaxis.

Inasmuch as proof of the efficiency of potassium sulfocyanate would be of great value in the determination of certain points relating to the question of immunity, the writer undertook an examination of the publications concerning this point. A critical examination at once revealed that a number of authors, among whom we might mention Miller, Edinger, and Schlegel, are not convinced concerning the protection to caries afforded by this agent; by far the greater number of prominent investigators, however, ascribe to it the properties claimed by its advocates. The arguments of the latter, among whom are Sanarelli, Martinotti, Michel, Lohmann, Low, and Beach, seem sufficient to justify us in accepting their views.

The fact that potassium sulfocyanate appears in the saliva in a remarkably short time after being taken by the mouth—Bunting and Ed. Neumann state this time to be from fifteen minutes to one hour—makes it the drug *par excellence* for caries medication, so that no practitioner of prophylaxis should fail to make an attempt to stay the ravages of that disease with a therapeutic agent which, to say the least, is promising.

PRACTICAL RESULTS OBTAINED FROM KCNS THERAPY.

The American literature on this subject, the greater part of which has appeared in the DENTAL COSMOS, is too well known to need discussion here. This subject, however, has been dwelt upon also in a number of essays which have appeared in the German dental and medical press, and it may perhaps interest some to learn the results which have been attained with this drug in the old world.

Detailed attention has been given to this matter by A. Lohmann of Cassel. This experimenter has met with varying success. In his first attempts the drug would not always agree with the patients, and in many cases had to be discarded, an objection which Dr. Lohmann attributes to the form in which the substance was prescribed. More recently, however, he has met with remarkable success with a combination of albumin with 19.4 per cent. sulfocyanic acid. This preparation has the advantage of being stable and not so hygroscopic as the old form of the drug, and has moreover been proved to be non-poisonous. It is given in the form of tablets weighing 0.25 gram, which contain 0.048 gram of KCNS. These tablets are purchasable under the name Rhodalzid. J. Nerking of Düsseldorf reports in the *Med. Klinik,* No. 6, 1912, a number of experiments made upon dogs to ascertain the toxicity of this preparation. He began by feeding a dog 15 gm. rhodalzid, which equals 2.88 gm. KCNS, within eight days; a second dog received 19.25 gm. rhodalzid, equaling 3.70 gm. KCNS, in five days. No deleterious influence was noted in either case.

Lohmann reports in the *Münch. Med. Wochenschrift,* No. 2, 1913, that he has met with the greatest success in cases of marked susceptibility to caries, and moreover has achieved pleasing results in cases of stomatitis, in other affections of the buccal mucous membrane, and also in purulent disorders of the nose and accessory sinuses.

A. Scheuer, in a contribution to the *Prager Med. Wochenschrift,* reports two cases in which the administration of the above-mentioned combination was followed, in the case of an anemic girl of twelve years, suffering from chronic eczema and acutely sensitive dentin, by a cure of the eczema and a lessening of the sensitiveness. In the case of a young lady of seventeen whose highly irritable general condition, due to Basedow's disease, was such as to preclude the initiation of the necessary dental treatment, rhodalzid medication was followed by a general quieting down, a decrease in the pulse rate, and disappearance of the exophthalmus existing in such cases.

The reports of these few authors are sufficient to demonstrate the regard in which the KCNS therapy is held here. In their hands it has proved efficient, not only in dental disorders, but in vari-

ous systemic anomalies. For the convenience of those further interested, a list of publications dealing with this subject is appended.

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PROCEEDINGS OF SOCIETIES.

FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

Union Meeting.

THE union meeting of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York was called to order by Dr. B. O. Chapman, Elmira, N. Y., president of the Sixth District Society, at 2 P.M., Thursday, November 20th, in the Federation Building, Elmira, N. Y.

Rev. Dr. William L. Sawtelle, Elmira, invoked divine blessings on the deliberations of the meeting.

City Chamberlain Hon. J. J. Crowley welcomed the societies to Elmira on behalf of the mayor of the city.

Dr. W. H. Leak, Watertown, responded to the address of welcome on behalf of the Fifth District Society.

Dr. W. W. Smith, Rochester, responded to the address of welcome on behalf of the Seventh District Society.

Dr. Abram Hoffman, Buffalo, responded to the address of welcome on behalf of the Eighth District Society.

Dr. W. A. WHITE, Phelps, spoke with regard to the educational work being done by the lecturers appointed by the state, and presented a resolution relative thereto, which on motion was adopted, and it was ordered that a copy be sent to the governor of the state.

The next order of business was the reading of a paper by Dr. J. J. MOFFITT, Harrisburg, Pa., entitled "Notes on Porcelain Work, with Special Reference to Retention."

[This paper is printed in full at page 681 of the present issue of the COSMOS.]

Discussion.

Dr. C. F. BAYLIS, Oneonta. Dr. Moffitt has given us such a clear conception of the technique of making porcelain fillings that there is very little left to discuss. This is a very opportune time for bringing porcelain as a filling mate-

rial to our attention. It is not many years ago when every practitioner in this section of the state was making porcelain fillings. We derived a great deal of satisfaction from porcelain fillings at that time, but found that there was a great deal of work to it. A great many practitioners could not command sufficiently large fees to pay for the time spent in making these fillings. Silicate cements then came upon the market, and porcelain was to a great extent abandoned. In visiting dentists throughout the state for the last few years, I have found few who were attempting to do much porcelain work, but I believe most of them now confess that silicate cements are not what we are looking for. Personally I believe that porcelain is the highest art that the dentist can aspire to; we can do with it almost anything, if we are willing to train ourselves to master this material.

A patient of mine who until recently lived in Chicago has in her mouth some very fine porcelain fillings for which she paid as much as one hundred dollars each, and she received full value for her money. I believe it is much to be regretted that we do not have more patients who properly appreciate this work and are willing to pay proper fees for it.

Dr. H. L. Belcher, Seneca Falls. I would like to ask Dr. Moffitt to tell us in closing the discussion how he cured the puncture in the root mentioned. A year go, at Rochester, I spoke of the use of Ames' pure white cement in setting porcelain inlays, because often, in cases of this kind, we find a porcelain inlay to be a perfect match to the tooth, but when we cement the inlay in the cavity, the shade is spoiled unless we use the proper cement. I suggested a year ago that by the use of Ames' pure white cement we can set such an inlay so as to produce an almost perfect match. I have since then, however, learned that the use of pure white cement is not always advisable, as it does not set quickly enough. Moreover, it is absolutely impossible to calcine the material at the necessary temperature to insure its hardness and density, and still have the "white shade." One can use the "pearl white" or "cream white," which is more suitable for porcelain.

Dr. A. P. Burkhart, Auburn. I have listened to a good many papers on porcelain inlay work, but Dr. Moffitt's is one of the best. The technique which he has described shows good judgment and a high degree of mechanical skill. Porcelain inlay work has not received due consideration from the dental profession. In my opinion, of all dental work, porcelain inlay work requires the highest degree of skill and patience. One important factor of skill that must be considered and mastered is the proper mixture of the various shades so as to insure satisfactory results. In this connection, I wish to call attention to a method which has proved very satisfactory in my practice. We frequently see anterior teeth in which the recession of the gums is so great that the exposed roots are unsightly, although there is no caries, and the teeth are apparently firm. In some such cases I have prepared cavities in the denuded roots, and, instead of using properly shaded porcelain as it comes to us, I selected the white porcelain as a foundation and finished up with what is known as "original gum enamel" used in continuous-gum work. In this way the appearance and the original shape of such teeth can be beautifully restored. This gum enamel is most useful in crown and bridge restorations, when, for instance, the right central incisor or the left lateral has been lost for a number of years and the absorption of the gum is so great that if a substitute were to be inserted so as to reach to the gum line, the substituted tooth would have to be so much longer than the original natural tooth that the resulting appearance would be most unsatisfactory to dentist and patient alike. In order to produce a sightly and artistic restoration in such cases, I select a facing of proper length, mark on it the length of the corresponding natural tooth, grind off the enamel extending beyond this line of demarcation to the natural gum, and on this ground surface bake gum enamel of proper shade.

A trial of this method of restoration will be found very gratifying.

Dr. F. A. Ballachey, Buffalo. I am glad to express my great pleasure at having heard this paper. Like a good many other dentists I would like to really *do* porcelain work such as the essayist has shown. I try to do a moderate amount, but, after having failed time and again in incisal corners of centrals and laterals, have stopped trying to place these fillings.

I use the porcelain inlay in labiogingival cavities in anterior teeth, sometimes in bicuspids, seldom or never in molars, though even in these teeth it is practicable in certain cases. In centrals, laterals, and bicuspids, the porcelain inlay is unexcelled by any other filling material.

I would ask the essayist to tell us in closing whether he encounters any difficulty in baking the body in the anchorage part of the cavity without its shrinking away from the sides; and when complete, whether the plug is of the exact size of the hole, or not. Also, in the bicuspid restoration shown, was the tooth pulpless or vital? I cannot think of obtaining retention of that nature in a bicuspid unless the tooth is pulpless.

Dr. M. B. Eschleman, Buffalo. Supplementing the remarks of Dr. Ballachey, I want to ask Dr. Moffitt whether in the restoration of the central and lateral shown he depends upon the strength of the lateral to support the inlay in the central, or *vice versa*.

Dr. W. H. Leak, Watertown. Although I do very little porcelain work, I thoroughly enjoyed the paper. In approximal cavities in canine teeth that include the mesial or distal occlusal surface, does the essayist apply the same method of anchorage to the lingual surface as he uses in the restoration of the incisor, or what method of anchorage would he recommend for such a filling?

Dr. A. McAlpin. I would like to ask the essayist to describe the technique of making the matrix in his closing remarks.

Dr. B. S. Hert, Rochester. A few years ago, in filling labial cavities, I always cut a groove around the side of the cavity and etched the cavity surface of the inlay, which I consider an excellent method for the retention of a filling. I would like to know what Dr. Moffitt thinks of that method. I advocated it several years ago, and in my hands it has been successful.

Dr. D. H. Squire, Buffalo. With the lateral incisor crowned and fastened to the large approximal inlay in the central without a dowel, I feel that the individual movements of the teeth in mastication will eventually loosen the attachment of the inlay to the central incisor. I know that when two approximal cavities in deciduous molars are facing each other, gutta-percha is the only filling material which can be placed upon a platinum support connecting these two cavities without loosening, because the movement of the teeth in the mastication of food will break up the crystals of either cement or amalgam. The restoration of mesial or distal corners of the anterior teeth with porcelain is beautiful work, but sometimes heartbreaking, because the enamel is often split away from the inlay along the incisal aspect, and the work proves to be a failure.

Articulating models for diagnosis is a step in the right direction. This is the only way by which a correct opinion can be given in regard to the choice of method of operative procedure. The anatomic restoration of the occlusal surface of the teeth is one which the profession has at last realized to be of great importance in maintaining the teeth in their proper alinement.

Dr. Moffitt (closing the discussion). I wish to thank this society for the appreciative reception accorded to my paper. The principal subject of the paper was anchorage of porcelain fillings, which has not been considered very much in the discussion.

Dr. Baylis refers to the question of fees. Of course we must charge fees for our work, but that question has nothing to do with keeping porcelain inlays in place. Silicate cements are no doubt good to use in their place, but in my experience they are not satisfactory in building up corners; I have therefore been trying to evolve a new method for anchoring porcelain inlays so that they will stay.

Dr. Belcher asked how I repaired the puncture of the root in the case described. I published an article in the COSMOS* some time ago on the treatment of punctures. One method I have used consists in making a casting and cementing it in the canal; the other consists in cementing a piece of platinum foil to the apical side of the puncture, and then burnishing the platinum foil into the puncture and around it on the sides, and covering it with cement. This method I know gives as good results as the gold casting, as I have several such cases of some years' standing.

As to the shadows in the cement, these would make no difference in a filling like this [illustrating], because the porcelain extends beyond the tooth on both sides. If this is the anterior surface, and the porcelain comes up like this, the color of the cement has to be determined by the thickness of the cement under the filling and according to the translucence of the porcelain. The higher fusing the porcelain the more translucent it is, and we must bear that in mind in selecting porcelain of lighter or darker shade. The adaptation of the filling to the bottom of the cavity also makes a difference, because, if it is pressed down closely, the quantity of cement will be small; if not, the cement layer is thicker and there is a shadow cast by it on the porcelain when the light is thrown from the other side of the tooth. These points have to be studied out correctly, but are not included in the subject of this paper.

I wish to thank Dr. Burkhart for his appreciative remarks. I have tried all these operations and I know they can be done, else I would not present them. He said that an operator had to be skilful to do this work. I think that every dentist has to be skilful in all of his work. An amalgam filling is as difficult to make correctly as any other operation which the dentist has to do. As to the indirect method of making porcelain inlays which Dr. Burkhart mentioned, the method suggested here applies to simple cavities. Some time ago I published an article in the *Dental Brief* (April 1913, p. 217) on the indirect method, which I prefer in many cases. The use of gum enamel is best adapted to bridges and crowns, but its use in inlays is somewhat difficult. Gum enamel is always of the same shade and cannot be varied to suit the conditions of the gums. I sometimes use Jenkins' pink porcelain, but prefer to carve my inlays and to paint with china paint the portion which I wish to color so as to resemble the gums. I prefer this method, because I can alter the shades to suit the case by mixing the paints.

Dr. BURKHART. I think you will all agree that in the Jenkins and other enamel outfits, up to the present time, we rarely get more than one or two shades of gum enamel, whereas we have seven or eight different shades in the enamel used in continuous-gum work, so that we are enabled to get any shade we wish.

Dr. MOFFITT. You speak of high-fusing porcelain as used in bridge work and crowns. I had reference to inlays. The use of gum enamel in inlays is a little difficult, because its fusing-point may not bear the proper relation to the inlay porcelain, and for other reasons.

Dr. Ballachey spoke of the restoration of incisal corners, and of the difficulty of making the pins of porcelain described. It does not matter always whether we burnish the foil into the holes or not. We can make the porcelain pins separate, first building them solid, baking and grinding them to the desired size, fusing them again if desirable, inserting them into the tooth instead of platinum pins, and making an impression around them as with platinum pins. I have done this several times, but it is more expedient to burnish the foil into the completed cavity, as shown here [illustrating]. Usually, I think perfect adaptation of the porcelain to the impression can be obtained, but we can prepare the porcelain pins previously if desired.

As to the question of whether the bicuspid in the case described was devitalized or not, I should say that we

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* See DENTAL COSMOS for August 1912, page 870.

do not often see a bicuspid with one side broken off unless it is devitalized. If the tooth is still vital, we can then devitalize the pulp and secure anchorage. If we do not care to devitalize the tooth, we can make pins on either side of the root-canal with endangering the pulp.

Dr. Eschleman spoke of the central and lateral restoration described, and asked whether the central supported the lateral or *vice versa.* This case simply shows what a porcelain worker can do by knowing how to use porcelain. The lateral incisor was affected with pyorrhea, and was so loose that it could hardly be retained. I made this operation as an experiment and fastened the lateral to the filling in the central; this restoration has been in place for five years, although I have been expecting, of course, that it would break down any time.

Dr. Hert spoke of etching the cavity surface of the inlay. If we are going to bake an inlay several times, we can just as well use different kinds of porcelain and leave such roughness as is necessary for the cement, rather than weaken any portion of the porcelain. By etching, the porcelain surface is disintegrated and parts of weakened porcelain remain. In grinding off the gloss some dust may remain in the pores of the porcelain. I think adhesion of the cement to the porcelain is best obtained by not quite glazing the inner portion of the filling, then using a lower-fusing porcelain to obtain the final glaze, and removing the platinum foil just before the inlay is cemented to place.

The meeting then adjourned until the evening session.

THURSDAY—*Evening Session.*

The meeting was called to order Thursday evening at 8 o'clock in the assembly room of the City-hall, by Dr. T. B. Cullen, Oswego, president of the Fifth District Society.

Dr. Cullen introduced as the speaker of the evening Dr. ARTHUR D. BLACK of Chicago, who gave an illustrated lecture on the subject of "The Pathology and Preventive Treatment of Diseases of the Peridental Membrane." [Dr. Black's lecture was practically the same as that published in the DENTAL COSMOS for December 1913, page 1219.]

Dr. Black's lecture was discussed by Dr. D. H. Squire, Buffalo, Dr. A. R. Cooke, Syracuse, Dr. H. D. Whitmarsh, Binghamton, and closed by Dr. Black.

The meeting then adjourned until Friday afternoon.

FRIDAY—*Afternoon Session.*

The meeting was called to order Friday afternoon at 2 o'clock by the president of the Seventh District Society, Dr. E. R. Griswold, Dansville.

The first item on the program for the afternoon session was the reading of a paper by Dr. CLYDE M. GEARHART, Washington, D. C., entitled "Practicing Practical Oral Hygiene," as follows:

Practicing Practical "Oral Hygiene."

By CLYDE M. GEARHART, D.D.S., Washington, D. C.

A curious and inquiring public, eager to know the cause of diseases to which man is heir, long since had many of its wishes gratified by the sages of the medical fraternity. One could reasonably suppose that this would satisfy almost any ordinary public, but, having had a course in the various prophylactic and hygienic measures advocated by the medical profession that revealed such astounding results for the benefit of mankind, the said public jumped with all fours upon the slumbering dental profession, which had been resting peacefully for many years.

This same clamoring public awakened the dental profession, and challenged it to take up the fight for higher ideals along its educational line.

THE EVOLUTION OF ORAL HYGIENE.

Recovering somewhat from the rude shock, the profession arose as from a lethargy, not to find itself stripped of its laurels, but clothed with a knowledge

and power heretofore undreamed of. The dentist of yesterday, whom the world had regarded as a man merely qualified to "pull teeth," "plug teeth," "lance a gumboil," or "fit store teeth," had been replaced by a man whose knowledge was broadened, whose field of endeavors was enlarged, and whose range of possibilities was increased.

I have said that the public had driven the dental profession to these ends. So it did, but the public was aided and abetted by some of the more intelligent members of the profession, who had discovered and exemplified great laws and principles governing the etiology and pathology of disease, as well as its therapy.

After the awakened dentist had been duly impressed with the appalling mouth conditions prevailing and had "acknowledged the corn," he too set about avowing to make restitution where it was possible—but the harder he labored, the greater appeared his task.

Many diseases, including those of the eye, ear, nose, throat, lungs, stomach, and intestines were traced, either directly or indirectly, to some source of infection coming from the mouth and teeth. The mouth was harboring millions of deadly bacteria that had no other way of elimination from the body except through the alimentary canal.

Statistics of mouth conditions were called for and furnished. The world gasped; the profession shuddered. Of the school children examined, ninety-seven per cent. presented mouths that were found to be in a diseased or faulty condition, and other statistics stated that only about ten per cent. of the population of the country was being given much-needed dental service.

These results found ready publication in many scientific and popular journals. A new era had dawned for our profession. The "tooth carpenter" was no more; in his stead stood the dentist in all his glory—a member of the medical profession.

The profession heard the call. This was evidenced by the brisk manner in which it delved into research and experimental work. In view of the fact that many diseases in the oral cavity are due to failure to keep the mouth and teeth clean, the theory was evolved that the reversal of these conditions might bring about a change for their betterment. The idea was wholesome; results justified the belief that "An ounce of prevention is worth a pound of cure," and thereupon started an educational campaign among the masses. Rules and principles were necessary to be formulated to simplify its teachings, and they are embodied under the head of "oral hygiene."

Lecturers preached oral hygiene; numerous articles appeared in the daily press urging oral hygiene; clinics were given, demonstrating oral hygiene. The well-known results of the famous Marion school class of Cleveland, Ohio, proved conclusively that neglect of the principles of oral hygiene impairs the intellect. Horrors! Would we all soon be imbeciles if we ignored oral hygiene? Even the "movies" seized the opportunity, and educational films were shown boosting oral hygiene.

Numerous cities attempted—and some succeeded—to establish free dental clinics and dispensaries. Some communities were fortunate in having generous legacies endowing these wonderful institutions. Less fortunate communities battled with the powers that be, and finally succeeded in raising enough money in some way or other to establish a clinic. Dental societies worked overtime planning various means of taking care of the hundreds of diseased mouths in their several communities until they could boast of a clinic. Thousands of mouths were treated; thousands of little souls made happy through the beneficence of these institutions, rendered possible by an awakened dental profession.

But the clinic once established, or plans for one well matured, this responsible professional man, the dentist, with a sigh of relief—the sigh nearly bursting with self-satisfaction—relinquished his hold and interest; feeling that he had done his part, he settled down once again to his private practice, reviewing with no little admiration the splendid achievements of the profession in general, and the remarkable influence

that his own personality had contributed.

NECESSITY FOR ORAL HYGIENE IN PRIVATE PRACTICE.

I wonder, is he getting ready to act once more the Rip van Winkle?

When a patient comes into one's practice, it is presumed that he has confidence in the dentist's ability and integrity to execute such needed services as are indicated. Did you ever stop to think that it is no small matter to settle in one's mind just to whom he will intrust the care of his mouth? Don't you suppose he has carefully weighed the selection of his dentist? And if that selection is you, he has done you a great honor in the bestowal of his confidence. Or are we obsessed with a flagrant notion of self-importance that has grown upon us until we have finally misled ourselves into believing that it is we who have bestowed the honor in serving him? Could our patients ever have just cause to believe that they have in us a misplaced confidence? Of course they could not, for there is not a member here this afternoon who has not always discharged all professional obligations to his patients in such a way as to preclude the slightest possibility of impeaching his reputation in the dignified profession which he graces!

But, somewhere, there are dentists who have strayed a long way from the straight and narrow path.

Everyone of us is familiar with the elementary principles of oral hygiene, and time need not be spent enumerating them. It would be absurd to advance the argument that we should not be governed in our practice by those practical rules that promote health in the oral cavity. Equally absurd is the absolute indifference displayed by many practitioners in their attitude toward the practical application of said rules. In view of the knowledge of oral hygiene which every dentist should have, the continued disregard of applying this knowledge in daily practice is little short of crime, and the patient who trusts such a dentist, who honors him with his confidence, is being wantonly betrayed every day in the year.

Do these men believe that the mere explanation to their patients of the objects and benefits of oral hygiene, together with a simple list of instructions, suggesting methods for maintaining oral cleanliness, fulfils their obligations to the patient in this worldwide movement to advance oral hygiene?

How inconsistent it is with the principles of oral hygiene if a dentist points out the necessity for frequent and proper use of the tooth-brush one day, and the next day inserts a bridge the construction of which is such as to form a veritable trap for food débris to lodge and putrefy, inaccessible to the patient's efforts to carry out the instructions given the day before!

DISREGARD FOR CONTACT POINTS AND FINISHED MARGINS.

What has become of the old-fashioned dentist, who, with his trusty knife-edged stone, murderously but conscientiously destroyed the contact points of bicuspids and molars, while laboring under the misapprehension that in so doing he was rendering a marked service to their confiding owner, believing that food would not be so likely to lodge in these spaces, and that if it did lodge there, it could be easily removed, and the teeth, therefore, be more readily kept clean. That dear old man is with us only in memory; but in his stead there is with us today a dentist who inserts fillings and crowns with as little regard for the proper restoration of that most invaluable contact point as did the old-fashioned dentist years ago. This dentist of today also has a failing of not finishing the margins of fillings, preferring to allow them to remain rough, particularly beneath the gum line, where they may often be found prodding the contiguous tissues—a sad violation of oral hygiene economy. What excuses can be offered to the patient for such negligence? Is this not the same dentist who cautioned the patient to be careful about brushing the teeth and keeping the oral cavity in a wholesome condition?

ILL-ADVISED EXTRACTIONS.

Who among you has not seen mouths that were wrecked by extraction of teeth to correct a crowded or irregular condition? Many times have I heard a statement like this: "When I was a little girl, the dentist told me I had too many teeth for the size of my jaws, and he extracted several perfectly sound teeth, so that the others would grow straight."

What was the result? The occlusion ruined, the remaining teeth malposed, interdental spaces exaggerated, and ofttimes beauty marred. From the esthetic view, how do canines approximating centrals appear to you?

To be sure, we must not condemn too severely this practice of extraction in years gone by, for the day of the orthodontist had not then dawned, and while it is quite probable that the kind old doctor knew that he was fibbing when he said there were too many teeth for the size of the jaw, yet he had not the knowledge or the appliances to correct these conditions, and probably did, in his judgment, the next best thing. However, we are more fortunate today in knowing that nature provides the proper number of teeth, each of which has a mission all its own. Nature sometimes errs in the proper development of the bony structures of the face, but the teeth that were once so readily sacrificed to equalize or compensate for this underdevelopment, now perform the important office of furnishing the orthodontist with absolute accuracy in the predetermination of a normal dental arch, that is closely followed by a consequent proper adjustment of the bony structures.

Many pathological conditions of the nose, throat, and eyes are often associated with constricted arches. The physical impossibility of properly masticating the food, and inability to breathe properly, are due to malocclusion, to say nothing of irregular teeth providing an ideal lodging-place for bacteria, and it really seems that a true disciple of oral hygiene has here a rare opportunity to do something practical.

THE OLD VS. THE MODERN PRACTITIONER OF DENTISTRY.

Of the rapid strides that dentistry has made in its different branches during the past decade, we all feel justly proud. Many of us have a feeling of genuine pity and charity deep in our hearts for the pioneer dentist, whose crude methods of procedure, whose oft mistaken judgment, whose wofully wrong technique have spelled ruin in countless mouths. We sympathize with these patriarchs and are profoundly grateful that we are living in an advanced age, where we are enabled to pursue our vocation with all the advantages of modern appliances, and the improved methods of procedure and technique at our command.

We heap no blame on the pioneer dentist; rather we revere him and graciously pardon his errors. There is perhaps not one present this afternoon who has not at one time or other tried to excuse and shield the services performed by some grand old man—who had acted in the capacity of family dentist for many years—for some newly acquired patient. This patient, feeling that he was not getting the benefit of as skilful service and scientific judgment as he would probably receive from your hands, comes to you, making known his confidence in your singular ability. That immediately appeals to you, and you are instantly filled with a pardonable pride for this recognition, but at the same time there is nothing clearer in your mind than the many great and sufficient reasons that have led this new patient directly to your door.

There were reasons for this patient leaving the older practitioner and placing himself in other hands. It is quite evident that his waning confidence was quickened by the knowledge that former methods of performing dental operations had been superseded by more efficient and scientific ones—that the progressive dentist of today had acquired and was giving his patients the benefit of a scientific training. The general discussion of oral hygiene has been very bene-

ficial in educating the laity. Its objects, workings, and results being so readily comprehended and appreciated, the laity was quickly and more easily able to discriminate between the just ordinary and the thorough, skilful services.

Patients are filling your practice with this confidence in your intent and ability. Be very wary lest you deceive your own self by your shortcomings, and by-and-by find yourself the object of pity and charity, with but the remnants of a once prosperous practice, deserted by a once trusting *clientèle* that has left you to seek the services of one who will give what they so righteously expected. You may not find the generous sympathy that has been bestowed upon the dentists whom you have succeeded, for, in this day, what reasons can be offered for not performing services that tend to preserve the teeth and protect the health of your patient?

PREVENTION OF PYORRHEA ALVEOLARIS A DUTY.

It is a well-known fact that at least eighty per cent. of dental diseases can be prevented by following a system of treatment and cleanliness, and yet there are quite too many dentists who, while they may be capable operators, noted for their exquisite artistic work, are absolute failures in diagnosing and treating even the early symptoms of disease that affects and finally destroys the retentive tissues of the teeth. There is no need to deny this regrettable condition, for it is a positive fact. Unofficial statistics disclose that seventy per cent. of the total loss of teeth is due to destruction of their retentive tissues, and, for the sake of convenience, permit me to refer to this condition as pyorrhea.

The mention of this word is hailed by many with delight, for it is behind its magic cloak that they seek to shield their omission of certain obligations to patients—obligations that are pre-eminent in the cardinal rules laid down for the practice of practical oral hygiene.

It is not within the province of this paper to discuss pyorrhea. Whether one believes it to be of constitutional or considers it to be of local origin is a subject the discussion of which generally precipitates a riot in any well-organized society.

While some of the brightest scientific minds in our profession are alining themselves with the "constitutional" side in what they believe to be an indisputable solution, and others with the "unconstitutionalists," holding on with a death-like grip to theories and alibis to establish their claims, we have still another class, who, if their work can be taken as a criterion, are like the Irishman who, after seeing a giraffe for the first time, pondered a moment and turning to his companion said: "B'jabers, there ain't no such animal!"

If the breaking-down of retentive tissues of the teeth is caused by calcic deposits on the roots, or if it is caused by ill-fitting bands and unfinished margins or fillings, we need no further proof that the progress of this pathological condition can be checked by proper treatment than the thousands of cases of record that have been thus corrected.

Even the most ardent believer in the constitutional causes of pyorrhea—taking for granted that he bases his reasons on scientific deductions and has not arrived at his conclusions purely by accident—prescribes it as right and proper to remove all local causes of irritation in any event. The men who claim that the cause is purely local lay every stress upon the removal of all forms of irritation. If the treatment thus far is mutually agreed upon, what, then, are the results to be obtained by practitioners who religiously avoid practicing unanimously indorsed interference with this most insidious disease? Can it be that they are simply indifferent to their patients' welfare? Can it be that they consider this service as a branch of the art beneath their dignity to perform? Or can it be that they are so far behind the progress which our profession has made as to share the opinions of the old-fashioned dentists, who "extracted for regulation," destroyed tooth structure "for cleanliness," and, when confronted with loosened teeth, gravely shook their heads and sadly asserted,

"You have pyorrhea; nothing can be done. You will soon need a plate."

It may be difficult for some dentists to believe, but it really requires some skill to do this prophylactic work. It also requires training and a good equipment. There is an old saying, "You can't saw wood with a hammer." Neither can one do delicate exploring and scaling with two or three clumsy instruments. But the acquisition of the skill, training, and equipment necessary for the work is not so hard as to be prohibitive to the man who is really interested in his patient's welfare.

Then we have the busy man, whose time is so taken up in crown and bridge work, inlays, and fillings that he has no time for such immaterial exertions other than superficially polishing the crowns of the teeth to comply with the esthetic requirement of the patient. I have myself been told by several practitioners that, while they realized that they were not doing as thorough work along prophylactic lines as they should, they were so rushed and crowded with other work that they just had to let it slip by. Think of men enjoying the confidence of so many people that they do not know which way to turn, and who, in order to keep up a lucrative practice, are giving every one of their patients a crooked deal, and admit it. When a man gets all the practice he can properly take care of, it is time to cease accepting new patients and to give some less fortunate practitioner a chance.

UNRELIABILITY OF MOUTH-WASHES AND OF MASSAGE IN PATHOLOGICAL CONDITIONS IN THE MOUTH.

A pathetic figure in our profession is the man who relies implicitly upon the therapeutic values of various mouth-washes and remedies to alleviate certain pathological conditions in the mouth. Does this sound familiar to anyone?—"Doctor, when I brush my teeth, my gums bleed. Is there anything I can use?" "Why certainly," promptly responds the doctor. "Get a bottle of Blank's Germicidal Astringent Deodorizing Tissue-building Mouth Reviver, and use every morning." "Will that stop the bleeding," asks the patient? "Why, certainly! If it does not, massage the gums vigorously after each meal."

While I do not believe that this practitioner has been induced by a generous supply of samples to campaign for a new proprietary mouth-wash, yet he has failed to diagnose the cause of the congested condition of the gums. He does not realize that he is prescribing a mildly antiseptic solution to perform the miracle of dislodging flint-like calcarious deposits that are impervious to its action, and are only amenable to surgical removal. To prove still further that he does not know what is wrong, he advises a vigorous massage of the soft gum tissue over these flint-like nodules, which cannot in any conceivable manner act in any other way than as an added mechanical irritation to the tissues. In some conditions mouth-washes are indicated, but all the mouth-washes in the country would not have sufficient remedial value in cases similar to these. In some cases massaging the gums is highly beneficial in stimulating the tissues, but the indiscriminate manner of prescribing mouth-washes and massaging as a panacea, as is often done, shows a disgraceful lack of thought. The deposits on the teeth are as foreign to their surroundings as would be a splinter in one's finger. Imagine the value of a lotion and massage for a swollen finger!

The worst of all mercenary mountebanks who filch from an unsuspecting public is he who, shielded by a diploma of Doctor of Dental Surgery, knowingly shirks evidently needed prophylactic operations and does other work solely because he thinks he can procure a higher fee. He may be apt enough to realize the value of restoring the mouth to an hygienic condition, but it is the almighty dollar that he is after, and he will acquire that dollar in the quickest manner his sordid mind can devise.

THE QUESTION OF FEES.

No one of us, I should say, is practicing dentistry for his health. When we consider the personal hazard, the con-

finement, the drain upon the nervous, physical, and mental vitality attendant upon dental operations, as well as the inestimable worth of the results to the patient, I do not know of any professional man who is more deserving of good fees for his work than the dentist. The latitude of our professional endeavors is not restricted to pure mechanics, as was once the opinion prevailing, and it now becomes a supreme duty to our patients, to our profession, and to ourselves to point out diseased conditions of the mouth, to enlighten our patients upon the significance of these conditions for their comfort and health, and to correct these conditions when possible; for all of which the conscientious practitioner is entitled to a fee as large, at least, as that which he would charge for any other operation requiring the same amount of labor and skill. But it is not within our rights to go through our patient's pockets with a lantern, so to speak, and to look around for the quickest and easiest way to get money when we know that only a limited amount of it is available.

CONCLUSION.

What can we hope for in regard to the ultimate success of the oral hygiene campaign without the active, earnest cooperation of every dentist, both by word and deed? We all realize and acknowledge the importance of spreading the gospel of oral hygiene. It is the duty owed to every community. It is one of the greatest humane trusts ever placed in any organization, and every dentist should be eager to stand sponsor for it in his respective locality.

Oral hygiene has the moral support of many, but it needs more than that! It needs the indorsement of every dentist in his daily practice by a close observation of its principles in a practical manner. If our efforts are to be crowned with success, we must practice what we preach.

Discussion.

Dr. R. E. Luther, Batavia. I deem it a privilege to be permitted to open the discussion on a paper which abounds with so many high ideals and which so forcefully outlines what a true professional gentleman should be, and what he owes to his patients, to his profession, and to himself.

If in discussing this paper I am supposed to take issue with the essayist, I am afraid my remarks will be disappointing, because I am so heartily in accord with what he has said that I can only add my mite in confirmation.

I am glad the essayist has emphasized the obligation we owe our patients who intrust themselves to our care. Our treatment of them morally gives us our standing as ethical or unethical dentists, regardless of how many dental societies we may be members of. We are not ethical dentists or honest men if we are not honest with our patients and give them the best service we can render, regardless of any monetary consideration. And we are guilty of criminal ignorance if we are not able to diagnose a case correctly and prescribe the proper treatment. There remains only the question, "Have we or can we acquire the skill to properly fill the prescription."

It is a lamentable fact that such conditions exist as have been described in the paper, viz, lack of proper contact point in fillings and crowns, poorly finished fillings, especially at the cervix, bridges of unsanitary construction, unwise extraction of teeth. That the poor work which we see has been done by a graduate, we know. I think I would be inclined to be a little more charitable than the essayist in the judgment of this work. I believe the greater part of this work is done by the quack—either the flagrant specimen, who, with printer's ink and gold signs, brazenly proclaims his station, or that more dangerous variety who sneaks up, wearing his lambskin coat, and strikes his victim from behind. Against these two classes of mountebanks, I am as loud in my condemnation as anyone. But there is another class of dentists who I will grant are as great a menace to the people as the first two classes. I refer to the men who honestly do their best, but who, through limited intellectual

power or lack of mechanical ability, cannot measure up to what the dentist of today must be, but who have been allowed to graduate.

What shall be the cure of these conditions? While I cannot go into detail, I believe the cure should begin first with the colleges. No college should be allowed to graduate a student who is intellectually unfitted or who lacks the mechanical ability to take his place with the best. I believe he should not be graduated unless his ethics are right. Secondly the societies must endeavor to keep the graduates in touch with all that makes for better dentistry. Lastly, the public should be educated to know what good dentistry is, so that only the fittest can survive.

With reference to orthodontia, I believe the question is rapidly taking care of itself. That branch is recognized as a distinct specialty, and I think dentists of the better class are now turning over to the orthodontist that sort of work.

It is entirely different with the treatment of pyorrhea and prophylaxis, however, and we find that the apparent lack of diagnostic ability and skill is appalling. The conditions pictured by the essayist are really not overdrawn. It seems difficult for some dentists to get away from the idea that prophylaxis in any way differs from the old-fashioned cleaning, and we even hear it suggested that it is just a way of using up a little extra time. It is astonishing how many dentists absolutely fail to even try to cope with pyorrhea, and there are even more who apparently are not able to recognize the disease or the conditions which result in the disease, or, if they do recognize it, they feel incompetent to treat it. Unfortunately, pyorrhea work is very distasteful to the average practitioner, which fact accounts for his lack of success in treating the disease, and as a result hundreds and hundreds of teeth are being lost daily because of lack of treatment. May the day soon come when the treatment of pyorrhea, like the work of orthodontia, will be referred to a specialist who loves the work, and who has developed the skill necessary to treat it successfully. I believe it is work which can be most successfully done by the man who is devoting his entire time to it. It requires patient, painstaking skill of the highest order, and when this technique has been acquired, the results and the appreciation of the patient are eminently pleasing to the operator and to the dentist who referred the patient.

With reference to the carrying of the gospel of oral hygiene to the people, I would say that it is true that the profession today occupies an entirely different position in the public eye than it did yesterday, and I predict that the time is not far distant when the dental profession will come to its own and take the place it justly deserves—second to none in its benefit to humanity by the prevention of disease. How has this been brought about? Are we not treating mouth conditions as we did a few years ago, due allowance being made for the improvement which would naturally result in that time? We are. But the people are being awakened to the fact that the "fountain of life" has been in their midst for years. The knowledge that our efforts and our product is being appreciated has stimulated us to double our efforts. Look at the work which is being done by the Scientific Research Committee of the National Dental Association. Look at the number of dental text-books which are being produced as compared with a few years ago. How has all this been brought about? I believe that oral hygiene and the knowledge that our profession is becoming in the eyes of the people a profession in fact as well as in name have done more than any other factor.

Oral hygiene today is occupying the minds of men of eminence in psychology, economics, pedagogy, and medicine, as well as others interested in all that tends to make a better race. There is nothing which contributes to good health and the prevention of disease which is receiving more thoughtful consideration by the thinking people today than oral hygiene.

Is this gospel of oral hygiene to be carried to the people by the psychologist or the economist? Are the physician

and the teacher to force the issue, and add to their laurels by fathering this great movement? Or is the dental profession to assume the responsibility which is justly theirs, and open the door to opportunity and thereby elevate their profession to the high plane where it justly belongs.

The opportunity which we have long sought is ours for the taking. Shall we sit back and say, "Yes it's a good thing, teeth should be saved, mouths should be clean"—and then go our way, earn our dollar, and leave the work for someone else to do? Or shall we demonstrate to the people, not by our words, but by our deeds, that we have confidence in our profession and what our work will do for humanity, by giving of our time and effort to the education of the public and the care of the mouths of the poor?

We need workers, we need men who will *do* things. We need men who will cheerfully and willingly carry the doctrine of oral hygiene to the people in the cities and towns and to the rural districts. We need men who are willing to take up the matter of school inspection and free dental clinics for the poor. It is a noble work, a work deserving of your best efforts. The people need it. It makes for a better race. It makes for a stronger people, and it is our duty.

Dr. E. E. Harrington, Watertown. It would seem unnecessary for me to say anything about the essayist's paper, which is a most excellent one. I would like, however, to say a few words about the examination of school children's teeth. Three years ago the Jefferson County Dental Society commenced the examination of school children's teeth, and the board of education has kept a record of the conditions encountered, which were truly astonishing. When the first examination was made, nearly three years ago, the percentage of children who did not need dental attention was as low as 12 per cent. The next term the percentage of those who did not need dental attention reached 20 per cent., and this term it was found that 26 per cent. did not need dental attention. During the past three years we have had in Watertown a dental dispensary, properly equipped, with ten dentists in attendance for two hours per day each. We have kept the dispensary open for five days a week, and have been able to take care of nearly all of the children who have presented themselves for treatment.

The essayist spoke of the frequent experience that dentists grow tired of active oral hygiene work after starting it with enthusiasm. We have not had that experience in Watertown; of the ten men who started this work, nine are still engaged in it—the tenth moved out of town. I think we have reason to be proud of what we have done there. If we live up to the ideals of the paper and the discussion, if we are honest with our patients in removing the causes of irritation of the gum tissues, we shall obtain better results from our work.

Dr. R. A. Wilbur, Elmira. The essayist's paper is full of ideals and principles to which we all cheerfully subscribe. I agree with Dr. Luther that men outside of our societies are largely responsible for the shortcomings which are held up to us. Since the theory of prevention by prophylaxis and oral hygiene has been brought so forcibly before the profession, these subjects always hold the attention of dental meetings. I therefore feel that the profession as a whole is making great strides to attain that perfection which shall meet the patients' requirements. No other subject requires more careful consideration on our part than the question of maintenance of oral hygiene in mouths in which there are crowns and bridges. Every dentist has to meet these conditions, and each must use his own judgment as to whether the difficulties placed in the way of maintaining perfect oral hygienic conditions is compensated for by the benefit which the patients derive from wearing a bridge or crown.

There is no need for fear that dentists will lack proper enthusiasm and conscientiousness in starting this work because it will lessen their fees. A practitioner can command just as high a remuneration for oral hygiene and prophylactic

work as for crown and bridge work. The question is not whether the patient appreciates our work so much at the outset, as whether we ourselves have the proper appreciation of it. If we have a cheap opinion of our own ability and professional skill, our patients will have the same opinion of us, but if we devote conscientious study to this work and attain a high consideration of our own personal worth and professional ability, the laity will have just as high an opinion, and will be as willing to pay for these services as for any other dental work.

Dr. L. S. Goble, Rochester. The question which the essayist has broached is such a big one and presents so many points that might be considered advantageously that I hardly know where to begin discussing it. A few simple rules in regard to crown and bridge work would help the whole profession, if adhered to, and would materially raise the standard of our work. For instance, if it were insured that the neck of the tooth in bridge work be the largest part of the abutment, that the dummy touch the edge of the gum and be self-cleansing, and that telescope crowns be used in order to insure proper fitting of the root—if these three rules were carried out to the best of our ability, we would have better success in our crown and bridge work. If, in the same way, we had a few simple rules to follow in filling operations, the results would be universally better. We all have noted fillings which are rough on the surfaces at the edges. We must remember of course that the dental manufacturers are partly responsible for this: they market amalgams that contain zinc, and after some time the fillings expand, and the operator is blamed for the resulting failure. Of course that does not excuse us for not polishing the surfaces of fillings in the proper manner.

The essayist has spoken of the practice of filing between the teeth. The old-fashioned dentists all practiced that. I remember hearing Dr. Requa tell me that he had shed most humiliating tears over teeth that had been ruined by grinding away the contact points, which was then common practice. The rank and file in all professions follow some fixed rule to destruction, stopping too late, after the damage is done. Instead of taking a new suggestion logically and carefully trying it out by experimentation, we adopt it blindly.

The essayist speaks of leveling up the teeth. In some mouths, the occlusal line of the teeth is very uneven, and the patient's appearance can be much improved by proper attention. I had a patient spend two hours and a half in my chair not long ago, and I worked as hard as I could during that time leveling his teeth. When I had finished, the man went to the looking-glass, looked at himself, and swore. I was beginning to insist that by leveling, smoothing, and polishing the teeth I had put his mouth in a better condition for eating, because the ragged edges had kept his mouth irritated all the time, so that he could not eat or even talk with comfort. He said, "I am not talking of that; what I want to know is why somebody has not done that long ago!"

Prophylaxis comprises absolute cleanliness, and keeping the surfaces of the teeth in a perfectly polished condition. It is not necessary that the patient report every two or three weeks to have prophylactic work done, but after his mouth has been thoroughly cleansed, the patient should do the majority of the work himself. About two per cent. of my patients require monthly prophylaxis, and not over five per cent. require it three or four times a year, while the rest have perfectly clean mouths.

The essayist cited statistics showing that over seventy per cent. of teeth are lost by destruction of the retentive membrane. I believe this to be true. I, moreover, believe that in the next fifteen years ninety-five per cent. will be lost from destruction of the retentive membrane, unless a little more knowledge is disseminated as to the proper manner of brushing teeth. Erroneous brushing, in my opinion, has more to do with the destruction of the retentive tissues and recession of the gums than all other factors combined, and if I had children, I would rather have them never brush their

teeth than brush them in the way taught all over the state. Our dental students are wrongly informed about the correct manner of brushing teeth in the colleges, and by some of our best men. A comparison of the teeth of twenty-five patients with delicate tissues, who brush their teeth in the proper way, up and down, and twenty-five patients who brush theirs in the old way, across the teeth, after two months would be most instructive.

Dr. Gearhart (closing the discussion). The object of my paper is an appeal to the members of the profession to put into practice the principles of oral hygiene, with which we are all so familiar. A paper of this nature does not permit of much discussion.

Dr. Wilbur states that it is only the men outside of dental societies who do not give the necessary attention to this important work. If this is true, would it not be well for us to do some missionary work and increase the membership of our societies? I do not believe that all the fault lies with the quacks, nor that these are the only ones who disregard the principles of oral hygiene, intentionally or otherwise, in order to perform other services which enable them to command better fees.

I believe that I speak advisedly in this particular, having watched the progress of oral hygiene carefully for several years, and it is with sincere regret that I am constrained to say that many ethical men are actually ignoring their obligations to their patients in this regard, and, consciously or unconsciously, are jeoparding not only the life of their patients' teeth, but the lives of their patients as well.

The next order of business was the reading of a paper by Dr. H. S. Dunning, New York, N. Y., entitled "Surgery of the Jaws."

Dr. Dunning's paper was discussed by Dr. G. B. Beach, Syracuse, Dr. F. M. Willis, Ithaca, Dr. J. C. Hertz, Easton, Pa., Dr. A. McAlpin, Bradford, Pa., Dr. F. A. Ballachey, Buffalo, and closed by Dr. Dunning.

The meeting then adjourned *sine die.*

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Annual Meeting, held January 27, 1914.

The regular monthly meeting of the Academy of Stomatology was called to order by the president, Dr. J. V. Mershon, in the assembly room of the College of Physicians, at 8 o'clock, on Tuesday night, January 24, 1914.

Dr. Mershon introduced as the speaker of the evening Dr. W. A. Sweeny, Baltimore, Md., who read a paper entitled "The Non-cohesive Gold Filling."

[This paper is printed in full at page 705 of the present issue of the Cosmos.]

Discussion.

Dr. Edward C. Kirk. I think you will agree with me that the essayist has set for me a very difficult task. I have read his paper many times, but since listening to his recital of the paper—which by the way was almost *verbatim* and a marvelous feat of memory—it has produced an entirely new impression on my mind, because of the personal touch which he has put into the rendering of it. Therefore the formal discussion I had prepared does not fit the case, so I want to discuss in an extemporaneous way the impression I have just received from Dr. Sweeny's presentation of it.

I remember a number of years ago reading with much satisfaction an appreciation of the life of Robert Browning

written upon the occasion of his death by George William Curtis in the *Atlantic Monthly.* In discussing the life of Robert Browning, as I remember the argument just now, Mr. Curtis said that Browning would survive as a poet, not because of his versification or his lyrical quality, but because of his religious philosophy. It was the splendid optimism of the religious philosophy set forth in the poetry of Browning that made him one of the greatest poets of the Victorian period. He said it is the tendency of all philosophies, of all religious systems, just as it is of biological organisms, to develop from the simple and homogeneous into the complex and heterogeneous, after which it generally happens that some one rises in the midst of the congregation and restates the elemental factors of the old philosophy, and the old basic doctrine sounds so strange that the reformer is promptly labeled as a heretic and is not infrequently excommunicated on the charge of heresy for simply restating the original foundations of the ancient faith. That was the impression made upon my thought tonight when I listened to this admirable address. It is now thirty-six years since I have been interested in watching the dental profession evolve, in so far as these methods and technique are concerned, from what was originally the simple and homogeneous into what is now the complex and heterogeneous. By that I mean I have witnessed the development from an almost universal use of non-cohesive gold and tin foil as filling materials, through cohesive gold, through the plastics, and through the inlay craze. Perhaps I should not say that last word as loudly as I have said it, but that is what I think it is. From the inlay craze on I do not consider myself competent to pass an expert opinion, but, as I say, I have witnessed the evolution up to that point. Now comes this heretic from Baltimore, and recalls us from that attitude of diffuseness of heterogeneity in our use of filling materials and in our technique, and indicts us—it is an arraignment, as I see it—for getting away from the original foundations of our dental faith.

I believe that these soul-searching occasions are wholesome for us. The essayist has raised questions well worth while for us to consider seriously. For example, I note that he lays stress on the fact that we have forgotten the usefulness of the earlier filling materials, such as non-cohesive gold foil. Some of us do not remember what was accomplished by that material; some of us are too young to know anything of the record of non-cohesive gold foil, and of the transitional stage when the dental profession was passing from non-cohesive to cohesive gold work. I wish particularly to call your attention to the point raised by the essayist with reference to the objection that it was not proper to use cohesive and non-cohesive gold in the same filling, for the reason that no perfect union could be made between these two kinds or varieties of gold foils. I had rather hoped that the essayist would also call attention to the fact that there could be no physical union between any kind of gold filling material and the walls of the tooth. That being the case, the objection to the lack of union between non-cohesive and cohesive foils falls to the ground.

I am glad that he made pointed comment upon the type of criticism which would condemn amalgam as a filling material by measuring it according to the standard of its worst performances. That is no argument. I have heard the same criticism used against dentistry in general, against medicine in general, that all physicians are humbugs, and the same might have been said about lawyers, undertakers, preachers, dentists, or representatives of any other human activity judged by the standard of their failures. It is not fair to measure the usefulness of any calling by its failures. Every man, every thing, should be judged by the standard of its best attainment.

I can do no more than merely emphasize some of the suggestions that have been brought out by the essayist and leave it to those of you who are specialists in the particular phases of this matter to discuss those questions. I wish to publicly express sincere sympathy with the attitude of the essayist

with reference to everything he has said. I suppose I am an old fogy; I am perfectly willing to admit that, for I think there are others here in the same category. I was in perfect sympathy with the theme of the essayist's first paper, "Prove All Things," and I accept in the same sympathetic spirit this sermon that he has preached to us, the underlying theme of which, as I conceive it, is conservatism. We have been chasing after strange gods; we have been worshipping them too often in an immoral way—not because what we are doing is for the best interests of the patient, but in too many instances because we believe that what we are doing is in the best interest of our bank account. Isn't it true? If it is not, then I apologize, but I believe it to be true that the commercial consideration has been a factor in much of the so-called advance in dentistry. I am not saying it in a personal way of any individual, but I say, that condition of things has characterized much of our present attitude with reference to the technique and methods that we use in dentistry; we use them not because we believe them to be for the best interests of the patient, but because that particular technique tends to increase our incomes.

I commend the paper for another feature, and that is the splendid attitude of ethical professionalism which pervades every line of it. The reference the essayist made to the question of dentistry in its relation to society; his critique on the statement—I do not remember having heard it said before, but I accept it as having been said as it appears in the paper—"that dentistry is not for the poor is representative of the attitude of the mind of the profession." If that be true, by and large, of the dental attitude, then we are not professional men; we are worshipers at the altar of commercialism, nothing else. The thing that has characterized medicine in its service to the community, I think more than anything else, is its altruistic attitude. I know there are rascals; I know there are commercial physicians, that there are charlatans in medicine; but we do not measure medicine by that type of man, we measure it by its best attainment, and if there is anything that has characterized the best achievement of medicine, it is its willingness at all times to render the best service to the community with no question or thought of reward. I take second place to no man in my admiration for that spirit characterizing the medical profession in its best expression, and the nearer we approach that ideal in dentistry, the nearer will we achieve what I believe to be our true professional stature.

Personally I want to thank the essayist for this arraignment, or this rehearsal, if you please, of some of the weak points in our professional attitude and professional practice, for it will help us to strengthen our position along the lines where they are weak. This final thought, and I am done: There is a certain justification in my mind, quite apart from commercialism, for the tendency to try out this or another thing at the expense of the patient. I do not mean the expense of the patient's pocketbook alone, but at the expense of the salvation of the patient's teeth; and that is because we have not had, thus far—only in an imperfect way—any other method of trying-out these things. There should be some definite, scientific method by which we can determine such a question as to whether the cemented inlay is to be a durable operation, whether it is to be a tooth-saving operation up to the standard of the inserted filling. We should be able to get at that by some other method than the so-called practical method of trying it on our patients and making them pay for our failures in the loss of their teeth. The time is coming, and I believe the dental profession is growing into that attitude of mind, in which such problems as that will be submitted to critical laboratory test in so far as it may apply, in order that we may get a better knowledge of the conditions with which we are dealing in the mouth before we resort to the unfair and extravagant method of trying it out on the patient. As an example of that, the whole question of the solubility of the cement material upon which the integrity of all inlays is dependent,

waits for its solution on our knowledge of the changes that take place in the composition of the oral fluids. As soon as our knowledge of the composition of the oral fluids, their reaction and so on, and their behavior with reference to various cement mixtures, has become more enlarged by careful scientific laboratory investigation, we shall be in better position to say in advance as to whether this particular cement composition is likely to endure in a particular mouth or not. These are questions that we have been unable heretofore to solve except by practical experiment in the mouth, but we should be able to have a great deal of preliminary information in regard to such matters derived from scientific research. Therefore, to the extent that we have been unable to utilize such resources, because no resources exist, there is perhaps some justification for our having tried it out practically on the patient. I feel, as I am sure you all do, thankful to the essayist for bringing so pointedly to our notice certain of our shortcomings, and I am sure that some of us are glad to give thanks and all-hail to the type of heretic who comes and rehearses before us the ancient creed in an attempt to put some of the ancient ideals of dentistry upon a firmer foundation.

Dr. M. L. Rhein, New York. It is surprising to see how easy it is to be misunderstood, as is perfectly evident to me after listening to the misinterpretation by the essayist of remarks I made in the discussion of a year ago.

There is no real comparison between amalgam and gold. Amalgam will always be an uncertain quantity, varying with age and climatic conditions. Gold, however, is a metal the properties of which we thoroughly understand. Those who desire to learn may make it their slave, to do their bidding at their slightest call, to make it follow the point of their plugger wherever they wish it to go, condense it to any degree of hardness that the metal is capable of reaching. All of this depends on practice, skill, and patience on the part of the student who desires to become the master of this metal.

In the treatment of carious teeth, the important goal is to understand proper cavity preparation. What avails it to insert a beautiful filling which in a few years, or in twenty years, fails? The majority of fillings are imperfect in a very short time, but in most instances this does not become apparent until the individual reaches the age of forty-five or fifty, just at the time when the teeth are most needed. When a tooth is filled once, it should be filled forever, otherwise it must be considered an inferior operation. This means not the stopping-up of holes, but cavity preparation depending upon the scientific consideration of the environment, not only of all present diseased tissue, but taking into consideration every possibility of new diseased tissue that may occur in that environment.

The essayist appeared greatly excited over my statement of a year ago that dentistry was "a luxury." From this he has very improperly and unjustly inferred that I am opposed to dental service for the poor. On the contrary, I thoroughly sympathize with what the essayist has said about the duty of the professional man in this respect. If, however, we are to serve the poor with constructive dentistry, then it must be of the same quality, and we must give it the same amount of time, that we give our private patients. There must be no distinction in the quality of this work. My plan for this purpose has been to do this in my own office, choosing such people as I thought most appreciative of the value of their teeth. A careful investigation of the constructive dental work done for the poor in the numerous free clinics that have been opened for this purpose demonstrates beyond doubt that the great value of this endeavor lies in the prophylactic work that is done for the poor. The constructive work will be found to be more or less of a "gold brick." When it comes to the question of the treatment of pulpless teeth, it generally means untold injury to the patient instead of a benefit. This has become already so well recognized in medical circles, that in a number of dental infirmaries the majority of teeth

in which the pulp is involved are extracted, in order to avoid the infections that follow so much of this infirmary dental practice.

The tirade of the essayist against the gold inlay brings up a most interesting question. An inlay, if properly constructed, is no easier operation than the most difficult gold filling. It presents, however, possibilities in the way of perfect restoration of the morsal anatomy and absolute indestructibility of the entire surface that no method ever before has presented. Because a dentist is unwilling to learn how to insert an ideal gold inlay is no argument for ridiculing the same.

It does not seem that the essayist has correctly interpreted Dr. Conzett's views in this matter; they appear to me no different in his second paper than in his first, except that he recognized that the poor inlay is just as bad for the public as the poor gold filling.

Last year Dr. Faught, and tonight the essayist, laid great stress on the statement that the weakest point in the inlay is the cement. This is also a fallacious argument when used against an inlay that has been properly designed and constructed. It is well put when speaking of a porcelain inlay, but does not apply to the gold inlay with its properly constructed flap. A gold inlay where the cement is the weakest point means nothing less than an imperfectly constructed inlay. The abuse of the inlay is undoubtedly a great evil, but no worse than all the results obtained from the rapid dental work that the dentist finds so popular with his patients, and so lucrative for his own pocketbook. It can be compared in a way to the department store quick sales and small profits. The public loves to be fooled in this way, and there will always be a large percentage of men ready to take advantage of its credulity.

It appears almost unnecessary to answer the diatribe that the essayist made against my statement that while the patient was in a state of immunity, it made very little difference as far as the ravages of caries were concerned, what kind of filling was inserted in the tooth. This subject has been so thoroughly exploited from a scientific standpoint that it is only necessary to call attention to the absurdity of the essayist's argument against it.

There is nothing in soft gold of a therapeutic nature such as the essayist told us.

Dr. SWEENY. I did not say that there was any therapeutic value in soft gold.

Dr. RHEIN. The essayist spoke of the preservative quality of soft gold as being distinct from any other form. This certainly implies a therapeutic value. No one has ever demonstrated the fact that any such condition exists. It is, however, generally understood that pure gold has the same qualities in whatever form it may be. It certainly is not likely that soft gold fillings and gold and tin fillings would have been relegated to practical obscurity by men like Taggart, Black, Conzett, Webb, Bonwill, etc., if such fillings possessed the qualities so absurdly claimed for them. If these claims were true, is it likely that this class of fillings would have been practically abandoned, as they have been? The fact that many of our modern methods and materials prove to be failures in the hands of inferior operators is no reason why the abler men in the profession should turn to the use of inferior materials.

Dr. C. C. HARRIS, Baltimore. The evening is growing late, and there is nothing that I could add to the subject that I did not say when I was here last, in favor of the old, time-honored non-cohesive gold. It so happened that Dr. Stevens of New York was in my office this week, and when I observed some of the fillings in his mouth made by myself some years ago, I concluded that possibly there would be some gentlemen at this meeting who probably never have seen non-cohesive gold as it was worked fifty years ago by our forefathers. I asked Dr. Stevens if he would not stop on his way to New York, that you might see these fillings in the anterior teeth, and I hope that after the meeting some of you will take the pains to look over this work, because it is to my mind as ideal as was the gold foil work done by Dr.

Chapin A. Harris, Dr. Horace A. Hayden, and the followers of that line of practice.

I am sure that few are familiar with the use of non-cohesive gold, as it was taught in the Baltimore colleges. I have, from the time I began practice, used non-cohesive gold for all root-canals that are in any way accessible. I will pass around some simple one-rooted bicuspids filled *to the apex* with non-cohesive gold. Dr. Sweeny extracted these teeth after they had done service for thirty-six years. I have taken a number of tubes closed at one end, and tried to get cement or gutta-percha to the end of these tubes, but I do not think that I succeeded in getting cement to the end of a single tube. Dr. Hardy of Baltimore requested a number of dental friends to fill certain roots of teeth, as they were accustomed to do in their practices; at a dental clinic he displayed these specimens, and not one showed the root filled to the end with either cement or gutta-percha. In crown work, the ends of the roots can be filled with a couple of little pellets of non-cohesive gold, which give double surety that no abscess will follow in many years to come. With the apex thus securely sealed, it matters little what is placed in the remainder of the canal. The one great need is a perfect alloy, and especially one free from expansion.

Dr. SWEENY (closing the discussion). It is perhaps a rather singular statement to make, but at this juncture I find myself in the position that Dr. Kirk announced in opening his discussion, namely, that the discussion has strayed so far away from the course I had expected it to take that it has rather sufficed to steal my thunder. I had, of course, some idea of the direction it would be apt to take, and in a measure had calculated my lines of reply, but the calculations have gone astray. Doubtless this is largely due to the fact that of the two gentlemen with whose views I disagreed, most unfortunately one is absent—regrettably so. Had he been here, it is more than likely that some part of the discussion would have stuck somewhat closer to what I said in the paper; however, that cannot be helped now.

One thing that I was particularly hopeful of was that the very point that the previous speaker touched upon toward the last, the preponderating importance of restoration and maintenance of occlusion, would be largely dwelt upon. It was distinctly invited in the paper. I am not finding fault, but merely express regret that such was not the case, because, as you all appreciate, the drift of my paper consisted of a reply not only to certain criticisms that appeared last spring, but also to a certain article I referred to now and again as a prophecy—and most of you are familiar with what that prophecy indicated. But at all events, even though that point was not dwelt upon, as it could not be under the circumstances, I will follow a few thoughts along that line. The situation is about this: We have two propositions which are both so apparent that we might practically say they are axioms. We all know what filling has done, and what has been done can again be done. We know—shall I say?—that teeth have been preserved by filling; or how shall I say it?

Dr. KIRK. I think you might risk that.

Dr. SWEENY. Let us put it this way. Cavities in teeth have been filled for years in such a manner that there has been no necessity to refill these cavities for a number of years, whether the fillings preserved the teeth or not; we will call it that. But where there has been an extensive loss of occlusal surface, we cannot restore or reproduce that form accurately with a filling; that is impossible, particularly with the gold filling. As has been aptly and truly said by the gentleman to whom I referred as being the author of the prophecy, we cannot make such a restoration perfectly with a rotating instrument. So we have on the one hand the maximum in the way of the so-called preservative property without efficiency or ability to restore the occlusion perfectly, while, on the other hand, it is equally obvious that we can restore that occlusal surface most beautifully with an inlay, if we could

only make the inlay as durable and as preservative as we wish, and make it everlasting; but a great many have been very strongly inclined to doubt that possibility. I do not think that I risk much when I say that the general attitude of the profession has long been and still is, that a filling can afford a lot of preservation together with a certain amount of deficiency of occlusal restoration, while, with the inlay, we get a perfect occlusal result, but are somewhat in doubt about the preservative qualities.

Dr. RHEIN. I do not agree with you.

Dr. SWEENY. I know you do not, but I think a great many practitioners do. My thought in this regard can be expressed in about this way: We have a good many cults springing up from time to time, and, as Dr. Kirk said, while many of these are supposed to be heretical, when they are traced back far enough, they are found to be merely the revival of old ideas. As far back as Bible days, we are told of a certain set of people whose motto was, "Let us eat, drink, and be merry, for tomorrow we die." These were the early advocates of what is called a short life and a merry one, and in view of some of the recent declarations about the overshadowing importance of the occlusal restorations, I cannot but revert to the time when preservation was the prime object sought, and was considered of greater importance than any other object, and it seems to me that we are witnessing the birth of a new cult whose motto is, "Let us chew and be merry, for tomorrow we must seek the prosthodontist." However, I do not know whether it is carried to such proportions as that or not, but that is something that I regret exceedingly was not more fully exploited. I still have a great deal of faith in the preservative properties of properly made fillings, and am still of the opinion that when we make fillings which, regardless of whether they preserve the teeth or not, stay in place for thirty, forty, and fifty years, and which cause no occasion for any other filling to be made, we had better adopt the motto of that statesman and pioneer who spoke the words I chose for my title—"Be sure you're right, then go ahead." We had better be sure we are right before we abandon this thing which we know so much about, before we take up things we are not sure about.

In the discussion of my previous paper, Dr. Faught said very truly that "The inlay has not been proved," and knowing him as I do and relying as thoroughly as I do upon his good sense and good nature, I will venture a slight amendment to his remark which sounds like a contradiction, although it is not. I will say that it has been proved in a great many instances, because in a great many instances it has been tried and found wanting. Therefore I think it is clearly the part of wisdom to go slowly and follow the maxim impressed upon my mind at one time by a clear-headed man in speaking of financial matters: "Never let go with one hand, until you get a good hold with the other."

Dr. RHEIN. Unfortunately I had no time to prepare a reply to Dr. Sweeny, and I beg your indulgence for the verbosity of my rejoinder. While I am on the most friendly terms with the strongest adherents of the inlay, I am absolutely opposed to the extremes to which they go. I want to say, however, that ever since Dr. Young published his article on the value of restoring the occlusal surface, I have been experimenting with the carving of the occlusal surfaces of gold fillings; and they can be carved when made of cohesive gold packed in such a way that its specific gravity is over 19—as it should be. These carvings are by no means equal to the results obtained by casting. I am still testing the value of carving occlusal surfaces of hammered gold fillings with the purpose of producing a result as near to normal occlusion as possible, believing this to be far better than the former smooth, polished occlusal surface. I should like to add here that a very important objection to the radical inlay movement is that it is interfering with the education of the young men as to the way of inserting gold fillings. They should, however, be taught to make them of a specific gravity of at least 19, and this can best be done with cohesive gold,

and there is no reason why Dr. Sweeny should come here and force down our throats the use of a form of gold so infinitely more difficult to manipulate.

Dr. SWEENY. But it is not.

Dr. RHEIN. It would be, if you had the training in the other.

Dr. SWEENY. I have had both.

Dr. RHEIN. So have I.

Dr. SWEENY. I will tell you publicly what I have told one or two of you privately. My first visit to you came about in this way. Several years ago I had a conversation with my dear friend, Prof. J. H. Harris, whose fillings some of you saw last May. I am not at all ashamed to say that I was directly responsible for having Dr. Harris' patient come here and show these fillings. I said to Dr. Harris before he died that he owed it to the profession to invite a few of the teachers, the men who wield the greatest influence, a few of the editors of the journals, a few influential men in the profession here and there and let them see him do some of that work, and it was that remark that finally eventuated in bringing me here, because, before this project could be carried out, Dr. Harris died. It was in correspondence with Dr. Kirk with regard to some obituary matter, following Dr. Harris' death, that the suggestion came up that possibly a paper dealing with his methods and ideas might be of interest. If any of you could have had the opportunity to see the rapidity and ease with which he turned out those operations just as you saw them, it would have sufficed to convince any ordinary man that it was not difficult at all, and that the idea that non-cohesive gold is intractable is all a myth. I would also have you bear in mind that, whilst he manipulated non-cohesive gold so wonderfully and successfully, he was by no means tied to it, because, as his son told you, he made fillings of cohesive gold, which in some cases looked almost like shell crowns, and have remained in place for nearly fifty years.

The society then adjourned.

DENTAL FACULTIES ASSOCIATION OF AMERICAN UNIVERSITIES.

Sixth Annual Meeting at Minneapolis, Minn., March 20-21, 1914.

FIRST SESSION.

THE sixth annual meeting of the Dental Faculties Association of American Universities was called to order on Friday, March 20, 1914, at 11 A.M., by Dr. Alfred Owre, in the Hotel Radisson, Minneapolis, Minn.

Dr. OWRE moved that Dr. Kirk act as temporary chairman in the absence of the president and vice-president.

The motion was carried, and Dr. Kirk took the chair.

Dr. SHARP moved that Dr. Breene act as secretary *pro tem.* [Motion carried.]

The first order of business was the calling of the roll, and the following representatives responded: Dr. Alfred Owre, University of Minnesota, College of Dentistry; Dr. F. T. Breene, University of Iowa, College of Dentistry; Dr. J. G. Sharp, University of California, College of Dentistry; Dr. Edward C. Kirk, University of Pennsylvania, School of Dentistry. Others present at the meeting were Drs. Edwin T. Darby and O. A. Weiss.

The next order of business was the reading of the minutes of the previous

meeting. Dr. Kirk presented as the minutes of the previous meeting the bound copy of the proceedings as distributed to the members.

Dr. SHARP moved that the printed minutes be accepted as read. [Motion carried.]

The next order of business was the reading of the President's address. Dr. Smith, the president, not being present, Dr. Alfred Owre read his address, as follows:

President's Address.

By EUGENE H. SMITH, D.M.D.

Members of the Dental Faculties Association of American Universities,—My message to you at this meeting will necessarily be brief, since the more important matters governing our organization were considered and recommended to you in my message of last year.

These several recommendations have been under consideration by the various committees during the past year, and will, I presume, be reported upon in full during our present session.

I would again call your attention to the need of a reciprocal system of research in our schools. I touched upon this matter in my last message, but made no special recommendations.

I feel that organized research work should be done within the schools themselves, acting in a reciprocal way, rather than through the medium of our dental societies. I therefore recommend that this matter in its various phases be considered at this meeting.

The action taken by the National Dental Association in investigating and rating the dental schools of the United States is, I think, to be commended, and while it is to be regretted that in the appointment of the committee to do this important work the university dental departments are not represented, I feel that we should be as helpful as possible, and at the same time still urge upon the Carnegie Foundation an investigation and rating of its own.

I beg to call attention to the following standing resolution in regard to admittance of students from other schools not holding membership in our association. It reads as follows:

RESOLVED, That students from American schools not holding membership in this association may be admitted to schools holding membership in this association, provided their preliminary training is equal to the training required of students seeking admission to our university schools, and that they be given credit for the time spent in dental study, but that no credit be given for any professional subject, and therefore that they must pass examinations in all subjects of the required course.

You will, I think, agree with me that undergraduates from the majority of these schools have not had the kind or extent of training that students in our school receive, and therefore are unable, without further training, to pass the required examinations of the years that they omit.

I would therefore recommend that the resolution be so changed that undergraduates may be permitted only to enter our second year, to take all of the courses of our first year during the first year of their attendance, and the courses of our second and third years during the second year of their attendance.

I would also call your attention to the lack of provision made for graduates of the schools outside of our association who may wish to enter one of our schools and become a candidate for our degree. I would therefore recommend that a resolution be passed at this meeting embracing the clause that refers to preliminary requirements that is contained in the resolution referring to undergraduates of other schools, and to which I have before called your attention; and to further provide that graduates from these schools be allowed to enter our senior year and become candidates for our degree by spending one year in our schools, and passing the examinations of our three years.

Meeting as we do each year at the home of one of our schools, it is most desirable that we spend as much of our time as may be consistent in the study and comparison of our methods of teach-

ing. Such study cannot be otherwise than mutually beneficial.

Dr. OWRE moved that consideration of the President's address be set for Saturday morning. [Motion carried.]

Dr. BREENE, secretary *pro tem.*, read the following invitations to the association to hold its 1915 meeting in San Francisco at the time of the Panama-Pacific International Exposition: Invitation from the Committee of Organization of the Panama-Pacific Dental Congress; invitation from Dr. Wheeler, president of the University of California; invitation from the Exposition authorities; invitation from the president of the Exposition Company; also a partial list of congresses that would be held at the time of the Exposition.

The next order of business was the report of the Secretary-treasurer, as follows:

Report of Secretary-Treasurer.

By EDWARD C. KIRK, D.D.S., Sc.D.

Mr. President and Members of the Dental Faculties Association of American Universities,—I have the honor to report that since our last meeting I have received letters from Dean Moorehead of the Dental School of the University of Illinois, from Dean D. M. Cattell of the Dental Department of the University of Tennessee, and from Dean Federspiel of the Dental Department of Marquette University, requesting information as to the terms and conditions governing membership in our association, all of which have been answered and the desired information has been furnished.

As instructed by your honorable body, the secretary forwarded to President E. J. James of the University of Illinois a letter embodying resolutions of this association commendatory of the action of the University of Illinois in creating a department of dentistry upon a high educational basis in connection with that university.

The official action of this association upon the application of the Tokio Dental School of Tokio, Japan, for admission of its students to privileges of advanced standing in schools of our association, was transmitted to the dean, Dr. Chiwaki.

The resolution of our association inviting the Carnegie Foundation for the advancement of teaching to make a study of the educational methods and equipment of schools within our membership was duly transmitted to the secretary of the Carnegie Foundation, and was officially acknowledged by him.

Our resolution expressive of our sympathy and interest in the suggestion for an interchange of teachers with German university dental schools was transmitted to Dr. N. S. Jenkins, Dresden, Germany, and its receipt was acknowledged by him.

Your secretary has also received a communication from the administration of the Panama-Pacific Exposition to be held in San Francisco in 1915, inquiring as to the date of our meeting for that year, and suggesting that it be held in San Francisco some time during the term of the Exposition.

The secretary officially notified Dean Kennerly of the Washington University Dental School that Dr. Hosford has been appointed a special committee to make investigation of the educational methods and facilities of that institution, in accordance with our regulations governing admission to this body. Your secretary has received no report from Dr. Hosford, but understands that a report upon the admission of the Washington University Dental School will be made by Dr. Hoff, chairman of the Executive Committee.

The documents connected with these various items of official correspondence are herewith submitted for your information and any detail discussion and any disposition which may be deemed proper.

The official report of proceedings of our last annual meeting have been printed and distributed as usual, copies

being sent to the constituent membership, to the universities constituting the membership of the Association of American Universities, to the National commissioner of education, to several state commissioners of education, the National Association of Dental Faculties, the National Association of Dental Examiners, and to numerous individuals who have made application for copies. The assistant commissioner of higher education of the University of the State of New York has announced his intention of referring to our proceedings in his forthcoming report on higher education, soon to be issued.

The proceedings of our association have also been published in full in the DENTAL COSMOS.

In pursuance of his official duties as prescribed by the constitution and by-laws, the secretary has endeavored to answer inquiries received from time to time from members of our association relating to the educational standards prescribed by our association, particularly as bearing upon the preliminary educational standards for the transfer of students and admission to advanced standing.

The experiences of the past in so far as they are revealed by the work of the secretary's office clearly indicate a growing interest upon the part of dental educators and those connected with education in general in the work of the association, and a growing belief that it not only fulfils an important function as a clearing-house of ideas of benefit to our members, but that it is justifying its existence with the dental profession generally from the emphasis it has from the beginning placed upon the necessity for high standards of efficiency in dental educational work.

A communication from Dean Sharp of the California School, relative to the desirability of establishing special lecture courses, raises a question of importance and interest which the association may deem worthy of their official consideration.

The financial condition of the association is set forth in the following exhibit:

Receipts:

Balance from 1912–13	$229.91	
Receipts for dues 1913–14..	300.00	
Total receipts		$529.91

Expenditures:

Nov. 14, 1913. Clerical services	$200.00	
Dec. 10, 1913. Printing trans.	37.00	
Jan. 7, 1914. Postage	3.67	
Total expenditures		$240.67
Balance 1913–14		$289.24

Respectfully submitted,

EDWARD C. KIRK, *Secretary-Treasurer.*

Dr. KIRK read a communication from Dr. N. S. Jenkins with regard to exchange of professorships with German universities, and said he thought that a proposition for an exchange of professors with American universities would soon come from Germany.

Dr. SHARP moved that the Report of the Secretary-Treasurer be received, and that consideration of the report be deferred until a later session. [Motion carried.]

The next order of business was the report of the Executive Committee. Dr. Owre read a letter from Dr. Hoff asking that the presentation of the report be deferred until his arrival.

The next order of business was the report of the Educational Committee, Dr. OWRE, chairman.

Dr. SHARP moved that the report of the Educational Committee be deferred until a later session, when all the members of the association could be present. [Motion carried.]

Dr. OWRE read a letter from Dr. Grant of the Educational Council, advocating the increase of fees in dental schools.

No action was taken on the communication.

The meeting then adjourned until the evening session.

SECOND SESSION.

The meeting was called to order by Dr. Hoff, vice-president, at 8 o'clock, in the University Club of St. Paul.

Those present at the meeting were Drs. Hoff, Breene, Owre, Sharp, the entire faculty of the University of Minnesota, presidents of the two local societies, Dr. Eck, vice-president of the Norwegian Society, and two members of the state board of Minnesota.

Dr. Hoff then introduced Dr. OWRE, who read the paper of the evening, entitled "Report of the Committee on Education," as follows:

Report of the Committee on Dental Education.

By ALFRED OWRE, M.D., D.M.D.

The chairman of this committee begs to submit the following report:

This association has already acknowledged the necessity for a better product in dental education, whatever the present status may be in the various sections of the country. Furthermore, if there is to be any advance educationally, the universities must take the lead. The acute criticisms of American dentistry recently aired in European journals are but one symptom of the status of things; another of equal value is legislation against American dental graduates. Europe has two special advantages over us in making her observations; age and geographical distance, if not distance in time. Naturally we must look to our own dirty linen. In the by-and-large sense, is the quality of American dental education such as to be really worthy of the high-sounding appellation? Observation and impartial analysis of the situation will show much rottenness, and with a steady increase in the rottenness, one is apt to wonder why the new plant is so slow in sprouting.

The all-powerful and low commercial ideals which are responsible for the present status of dentistry are well entrenched, but a new order of things can be inaugurated if the psychological moment is grasped. To state that improvement is necessary is not sufficient. Whatever is to be done must be backed by a strong and sincere desire. To advance dentistry is a movement which requires the greatest co-operation; by this I mean that it requires all the support the university schools and other institutions can give any forward step. A half-hearted attitude will be ruinous.

In connection with a program for the enlargement of the curriculum,* I want to state that it is not so much the content of a given year which concerns us, as it is a genuine belief that we need more time for good work in much that is now being taught. Neither can we ignore the fact that it is pedagogic economy to bring to this work students who have had better preparation. It seems desirable to have a requirement and curriculum with a certain amount of elasticity in it, so as to meet individual idiosyncrasies and to allow for certain inherent local differences in educational systems. When a large and varied clinic is not available, the number of electives could be increased. This would have the advantage of producing men more powerful and fitted for certain kinds of work. The faculties may also recommend certain electives suited to the needs of their respective localities, or make certain substitutes. For instance, it may be necessary to substitute botany for animal biology, if the latter could not be obtained in the prerequisite course. A further illustration would be to recommend elementary political economy in the second semester of the freshman year, elementary psychology in the sophomore or junior years, and ethics in the senior year. The value of the electives cannot be overestimated, viewing the product of colleges where it has been practiced. With the help of the elective we have an unconscious, impelling ideal, which usually results in a man of greater power than a prescribed curriculum generally produces.

If we made better dentists twenty-five or thirty years ago, it was not only due to the fact that there was less to learn and a lesser degree of commercialization, but also due to the fact that we had more time in which to do it. In our read-

*See detailed report of hours, pp. 750–752.

justment to the ever-increasing demands we have increased the number of hours of work until the whole curriculum is more or less pedagogically unsound. The academic student has a maximum of about 600 hours of assigned work per year; engineers not over 700 hours; medical students about 1100 hours. There are about 1400 hours available if we assign eight hours every day, excepting Saturday afternoon. Many dental schools assign 1200 hours of this amount. This is something like a boil ready to burst without further analysis of the quality of work that can possibly be done. Pedagogically there are more hours of assigned work than the student can carry profitably, and the quality of his work suffers. Short, slipshod methods are resorted to, and our average dental graduate is not the carefully trained man he should be.

It has been the aim of the committee to keep down the number of assigned hours, especially in the first two years, where theory predominates. This is not quite so important in the third year, and less so in the senior year, where practice fills up nearly all the hours.

In the present course we average about 1200 hours per year, the first year being the lowest, about 1100 hours. In the proposed four-year course, the average is about 1000 hours, with less assigned hours in the first two years—832 and 960 hours in the freshman and sophomore years respectively, as against 1184 and 1232 in the junior and senior years. In the course having one year of academic work as a prerequisite, there is about 100 hours less of assigned work in this year. This is largely due to the fact that the academic year must conform to academic usages. The assigned hours for the freshman year of dentistry are 944 as against 832 of the four-year course, otherwise the hours are about the same.

Further advantages and disadvantages of the two propositions are as follows:

The four-year course is definite, and is also more directly under the control of the dental faculty. In emphasizing prosthetic technique in the first semester of the freshman year it is possible for many students who do not find themselves adapted for dentistry to make the change without very much loss. The course is also more perfect in the sequential arrangements of subjects. It may be criticized because it requires attendance in the dental school for a total period of four years.

In regard to the course where one year of academic work is a prerequisite, a special advantage is that it is specifically an academic year, and can be taken in many places in the smaller colleges. It allows students a longer period of reflection in regard to their life-work; there is no waste in choosing another calling. It has a wider range of electives, otherwise there is not so much difference, providing the subjects indicated are adhered to. It cannot be claimed altogether as a preparatory year for dentistry, and is not under the direct control of the dental faculty.

From the foregoing it seems possible to adopt the four-year course practically as outlined, and with some readjustment in individual cases to make use of the other. For instance, students who have had one year of academic work should be able by summer-school work and perhaps some special work here and there, to go on with the sophomore class. The details of this must be worked out by each institution.

The question of fees can be adjusted at a future conference, but uniformity is recommended as far as possible.

Respectfully submitted,
J. G. SHARP,
E. C. KIRK,
E. H. SMITH *(ex-officio)*,
ALFRED OWRE, *Chairman.*

Dr. Owre's report was discussed by Drs. Hoff, Sharp, Dr. Orr, secretary of the state examining board, Dr. Andrews, member of the state board, Drs. Kennerly, Hartzell, Breene, and Weiss.

Dr. HOFF announced that the report would be presented before a business session of the association on Saturday for action by the association.

The meeting then adjourned until Saturday morning.

Four-year Course.

Freshman Year.

Subjects.	*Hours.* 1st Sem.	*Hours.* 2d Sem.	
Anatomy, General Descriptive		96	
“ Dental, Lectures		16	
“ “ Laboratory		96	
Animal Biology No. 1, Gen. Zoölogy	96	96	
Chemistry, Adv. Gen. and Qual. 3 and 4	64	80	
Prosthetic Technique	144	48	
Rhetoric	48	48	
	352	480	Total 832

Sophomore Year.

Subjects.	*Hours.* 1st Sem.	*Hours.* 2d Sem.	
Anatomy, Dissection	144		
“ Histology and Embryology	96		
“ Dental, Lectures	16		
“ “ Laboratory	48		
Bacteriology		80	
Chemistry, Organic	96		
Crown and Bridge Technique		96	
Operative Technique		96	
Physiology and Physiological Chemistry		144	
Prosthetic Dentistry Technique	48	96	
	448	512	Total 960

Junior Year.

Subjects.	*Hours.* 1st Sem.	*Hours.* 2d Sem.	
Crown and Bridge Technique	96	96	
“ “ “ Lectures	16	16	
“ “ “ Practice		96	
Dental Metallurgy	16		
Materia Medica		32	
Operative Dentistry Lectures	16	16	
“ “ Technique	72		
“ “ Practice	72	144	
Orthodontia Lectures		16	
“ Technique	144		
Pathology, General	80		
“ Special		16	
Prosthetic Lectures	16	16	
“ Practice		96	
Therapeutics		16	
Clinics		48	
Electives*		48	
	528	656	Total 1184

Senior Year.

Subjects.	*Hours.* 1st Sem.	*Hours.* 2d Sem.	
Crown and Bridge Lectures	16	16	
“ “ “ Practice	144	144	
Operative Dentistry Lectures	16	16	
“ “ Practice	192	192	
Oral Surgery Lectures	32	16	
“ “ Practice	48	48	
Orthodontia Lectures	16	16	
“ Practice	72	72	
Prosthetic Practice	72	72	
Theory and Practice Conference		32	
Electives†			
	608	624	Total 1232
			Grand total 4208

* Psychology, Elementary Economics, Radiography, Odontology, etc.

† Students who are advanced in practice should be allowed to specialize in any part of the curriculum, especially in the second semester.

One-year Academic Prerequisite.

Freshman Academic Year.

Subjects.	*Hours.* 1st Sem.	Credits.	*Hours.* 2d Sem.	Credits.	
Animal Biology No. 1, Gen. Zoölogy	96	6	96	3	
Chemistry, Adv. Gen. and Qual. 3 and 4	64	3	80	3	
Electives (to make 9 credits)	48	3	96	6	
Military Drill (required U. of M.)	48		48		
Rhetoric, No. 1	48	3	48	3	
	304		368		Total 672

Freshman Year Dentistry.

Anatomy, Gen. Descriptive	96		
" Dissection		144	
" Histology and Embryology	96		
" Dental, Lectures	16	16	
" " Laboratory	48	96	
Chemistry, Organic	96		
Physiology and Physiol. Chemistry		144	
Prosthetic Technique	96	96	
	448	496	Total 944

Junior Year.

Bacteriology, General	80		
Crown and Bridge Lectures	16		
" " " Technique	144	144	
Dental Metallurgy	16		
Materia Medica		32	
Operative Dentistry Lectures	16	16	
" " Technique	144		
" " Practice		144	
Orthodontia Lectures		16	
" Technique		144	
Pathology, General		80	
" Special		16	
Prosthetic Lectures	16	16	
" Technique	144		
" Practice		96	
	576	704	Total 1280

Senior Year.

Crown and Bridge Lectures	16	16	
" " " Practice	144	144	
Operative Dentistry Lectures	16	16	
" " Practice	192	192	
Oral Surgery Lectures	32	16	
" " Practice	48	48	
Orthodontia Lectures	16	16	
" Practice	72	72	
Prosthetic Practice	72	72	
Theory and Practice Conference		32	
Therapeutics	16		
Electives			
	624	624	Total 1248
			Grand total 4144

Summary of Hours.

Subjects.	Present, 1914-15. Hours.	Four-year course. Hours.	Academic prerequisite. Hours.
Anatomy, Gen. Descriptive	128	96	96
" Dissection	192	144	144
" Histology and Embryology	96	96	96
" Dental Lectures	32	32	32
" " Laboratory	96	144	144
Animal Biology No. 1, Gen. Zoölogy		192	192
Bacteriology	32	80	80
Chemistry, Adv. Gen. and Qual. 3 and 4	144	144	144
" Organic	96	96	96
Clinics		48	
Crown and Bridge Lectures	32	64	48
" " " Technique	288	288	288
" " " Practice	288	384	288
Dental Metallurgy	16	16	16
Electives	48	48	144
Materia Medica	32	32	32
Military Drill (required U. of M.)			96
Operative Dentistry Lectures	64	64	64
" " Technique	144	168	144
" " Practice	528	600	528
Oral Surgery Lectures	48	48	48
" " Practice	96	96	96
Orthodontia Lectures	48	48	48
" Technique	144	144	144
" Practice	144	144	144
Pathology, General	32	80	80
" Special	16	16	16
Physiology and Physiological Chem.	144	144	144
Prosthetic Lectures	32	32	32
" Technique	336	336	336
" Practice	240	240	240
Rhetoric No. 1		96	96
Theory and Practice Conference	32	32	32
Therapeutics	16	16	16
Total	3584	4208	4144

1 day = 8 hours.
11 half days = 1 week = 44 hours.
16 weeks = 1 semester = 704 hours.
2 semesters = 1 year = 1408 hours.

THIRD SESSION.

The meeting was called to order Saturday morning March 21st, by Dr. Hoff, vice-president, at 9.30 o'clock, in the University of Minnesota.

The first order of business was the consideration of the address of the president.

The first item in the President's address for consideration was the recommendation that "organized research work should be done within the schools themselves, acting in a reciprocal way, rather than through the medium of our dental societies."

This question was discussed by Drs. Owre, Kirk, Hartzell, Hoff, Sharp, after which Dr. Sharp moved that a Committee on Research be appointed for the purpose of formulating plans and bringing about a coalition of the work of this character in the schools. [The motion was seconded.]

Dr. Kirk offered as an amendment to the motion that Dr. Smith be made a committee of one to bring in a report on that matter.

The amendment was voted upon and carried, after which the original motion was put and carried.

The next item for consideration was the action of the National Association of

Dental Examiners in investigating and rating the dental schools of the United States, and urging the Carnegie Foundation to make an investigation and rating of its own.

Dr. Kirk called attention to the fact that the Carnegie Foundation had signified their intention of making such an examination and rating at some future date.

Dr. Owre moved that the secretary be instructed to correspond with the Carnegie Foundation and express the appreciation of the association of their further interest in the matter.

The motion was seconded and carried.

The next recommendation in the address of the President was with regard to the standing resolution governing the admission of students from other schools.

Dr. Owre moved that the question be laid on the table; seconded by Dr. Kirk, and carried.

The next item for consideration was the lack of provision in the standing resolution for graduates from other schools who wish to enter schools of the association and become candidates for the degree.

Dr. Kirk interpreted Dr. Smith's recommendation to mean that a qualified practitioner coming to one of the schools of the association and wishing to become a candidate for the degree should be required to meet the present entrance requirements and pass all examinations of the entire curriculum, besides taking the senior year.

Dr. Owre moved, and Dr. Sharp seconded, that this suggestion be incorporated in the resolution.

Dr. Kirk presented as the amended resolution the following:

Resolved, That graduates of dental schools not holding membership in this association may be admitted to the senior year in schools holding membership in this association, provided that their preliminary training is equal to the training of students required for admission to our university schools, and they may become candidates for graduation after fulfilling the requirements of the senior year, provided that they pass examinations on all of the subjects that are final in the first and second years of the course before coming up for final examination for the degree.

Dr. Owre moved, and Dr. Sharp seconded, that the resolution be adopted as read. [Motion carried.]

With regard to the recommendation in the President's address that undergraduates be permitted to enter only the second year, Dr. Owre moved and Dr. Kirk seconded that this recommendation be laid on the table. [Motion carried.]

The next question for consideration of the association was the date of the meeting for 1915.

Dr. Kirk moved, and Dr. Owre seconded that the question of the date of the 1915 meeting be left with the College of Dentistry of the University of California and the Executive Committee. [Motion carried.]

Dr. Sharp moved that the invitations be accepted and the secretary be instructed to acknowledge receipt of them, and inform those who had sent invitations of the action of the association. [Motion carried.]

Dr. Hoff, as a committee of one to investigate Washington University Dental School with a view to receiving this school as a member of the association, reported that he had examined the Washington University school and found the conditions favorable for the teaching of dentistry according to the standards of the association. Dr. Hoff reported that the equipment of the school was not as good as it could be, but that they were waiting for the completion of a new building before putting in a better equipment.

Dr. Kirk moved, and Dr. Owre seconded, that the report of the committee be accepted. [Motion carried.]

Dr. Owre moved, and Dr. Kirk seconded, that the Dental School of the Washington University be admitted to membership in this association. [Motion carried.]

Dr. Kennerly, dean of the Dental School of Washington University, was presented to the association.

The next order of business was the consideration of the Report of the Secretary.

This first item of consideration was the question raised by Dr. Sharp with regard to establishing special lecture courses on different subjects.

Dr. Sharp explained that the object of this was to have men give special lecture courses in the schools, and that the various schools of the association work together in procuring these lecturers. For example, he said, Dr. Pickerill has agreed to come to the Dental School of the University of California and give a course of lectures, and if any other schools wished such a course the financial expense would be lessened for all schools.

After discussion of the question by Drs. Sharp, Hoff, Owre, and Kirk, Dr. Kirk moved that in any instance where any member of the Dental Faculties Association is contemplating such an arrangement, that it make the preparation and plan known to the secretary, so that the secretary may send to each constituent member announcement of the fact, with a view to making an organized reciprocal arrangement under that plan.

Dr. Kennerly seconded the motion, which was carried.

Dr. Owre moved that the Secretary-treasurer's report be adopted as a whole. Dr. Sharp seconded the motion, which was carried.

Dr. Hoff presented the report of the Executive Committee, as follows:

Report of the Executive Committee.

To the Dental Faculties Association of American Universities,—At the last session of this body, I was asked to formulate a suggestion that would more equitably adjust the matter of advanced standing for students having had partial courses in medicine, who were desirous of transferring to the dental course.

In accordance with past practices and present rulings, we have not credited work done in a medical school unless the student has completed the medical course and has the medical diploma, except that we allow such undergraduate medical students to take advanced standing on individual subjects, if the medical work has been taken in the university with which the school in dentistry is associated. It ordinarily develops that medical students with junior standing have completed all the medical science subjects required in the dental curriculum, and it does not seem equitable that such students should be held to the same time-limits as entering freshmen who have never had the medical science training. Such subjects as chemistry, anatomy, histology, physiology, and bacteriology are as thoroughly taught in medical as in dental schools, and together they should constitute more than a year of time in the dental curriculum. There is no reason why a student having credit for such subjects would not be capable of completing in the remaining two years of the dental course all the applied scientific subjects, as well as the technical and clinical subjects of the curriculum.

I therefore suggest for your consideration, the following resolution:

Resolved, That undergraduate students of reputable medical schools, who have completed at least two years' work, and who have credits for the full requirements in chemistry, anatomy, histology, physiology, and bacteriology, may be given credit on examination for these studies, and be advanced to the second year in the dental curriculum.

Respectfully submitted,

N. S. Hoff.

Dr. Owre moved that the discussion of the report of the Executive Committee be deferred until the afternoon session. [Motion carried.]

The meeting then adjourned until the afternoon session.

FOURTH SESSION.

The meeting was called to order Saturday afternoon, March 21st, at 3 o'clock, by the vice-president, Dr. Hoff, in the Hotel Radisson.

The first order of business was the consideration of the resolution presented in the report of the Executive Committee, as follows:

RESOLVED, That undergraduate students of reputable medical schools, who have completed at least two years' work, and who have credits for the full requirements in chemistry, anatomy, histology, physiology, and bacteriology, may be given credit on examination for these studies, and be advanced to the second year in the dental curriculum.

Dr. KIRK suggested that because of the fact that such a resolution would involve antagonism with statutory legislation in many states, final action should be postponed until this question has been referred to a committee, to report on later.

Dr. OWRE moved, and Dr. Kirk seconded, that the resolution be laid on the table for further investigation. [Motion carried.]

Dr. KIRK moved, and Dr. Kennerly seconded, that this question be referred to the Executive Committee. [Motion carried.]

The next order of business was the consideration of the report of the Educational Committee by Dr. OWRE.

Dr. OWRE re-read his report, as the full membership of the association was not present when it was first presented.

Dr. SHARP suggested that a resolution be presented lengthening the curriculum to four years.

Dr. KENNERLY suggested that if the report and recommendation was adopted, that it be not at too early a date, as it would be necessary for him to have time to think over plans for the future.

Dr. OWRE did not think that the association could take any positive action at the present time, but what the association did would of course have to be referred back to the governing bodies of the institutions represented for approval.

Dr. HOFF discussed the feature of the report which presented the alternative of one year of academic training as a prerequisite to dental study, and was inclined to favor this in preference to the lengthening of the curriculum to four years.

Dr. KIRK thought that the object of the four years' course was to teach more dentistry and establish a better standard, and in order to do that it was necessary to have more time in the dental course.

Dr. OWRE said what the committee wished to recommend was the four-year dental curriculum rather than the addition of one year of academic training to the preliminary educational requirements.

The subject was further discussed by Drs. Weiss, Walls, and Orton of the University of Minnesota.

Dr. KIRK moved, and Dr. Sharp seconded, that "We accept the report of the Educational Committee, and that we recommend the four years' curriculum as set forth in the report for adoption by the schools of this association."

After discussion of the motion by Drs. Breene, Kirk, Weiss, and Walls, it was carried.

Dr. KIRK thought one of the best means of putting into force the four years' curriculum would be to secure the co-operation of the legislative authorities, with a view to having legislation that would require the four years' course as a requirement for license to practice dentistry, and ask for some suggestions from the members with a view to securing this co-operation.

Dr. OWRE thought it would be well to acquaint the National Dental Association and the National Association of Dental Examiners with the action taken, and possibly suggest that this question be made a matter of consideration at their next session.

Dr. OWRE moved, and Dr. Kennerly seconded, that the secretary be instructed to communicate with the officers of the National Dental Association and the National Association of Dental Examiners, and inform them of the action taken and send to them a copy of the report with the proposed program. [Motion carried.]

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—Dr. N. S. Hoff, Ann Arbor, Mich.

Vice-president—Dr. F. T. Breene, Iowa City, Iowa.

Secretary-Treasurer—Dr. Edward C. Kirk, Philadelphia.

Executive Committee—Dr. J. G. Sharp, Chairman (one year), Dr. J. H. Kennerly (two years), Dr. F. T. Breene (three years).

Educational Committee—Dr. E. H. Smith (one year), Dr. E. C. Kirk (two years), Dr. Alfred Owre, Chairman (three years).

The next order of business was the selection of the time and place of the next annual meeting. The place of the next meeting having been decided upon, namely, San Francisco, the time of the meeting was left to the decision of the Executive Committee.

Dr. KIRK. I would like to move that a vote of thanks be extended to the University of Minnesota, and particularly to Dr. Owre, for the delightful hospitality we have received at their hands, and in making the motion I would call attention to what seems to be one of the most important things we have learned here, apart from what may be called the technical aspect of the work of the University of Minnesota, but the thing that has impressed me more than anything else—that is, the practical results they are getting here from the impression of the personality and the ideals of the head of the dental department, and after all, that is the most important educational result to be achieved.

Dr. KENNERLY seconded the motion, which was unanimously carried.

Dr. KIRK moved that, "When we adjourn, we adjourn to meet in San Francisco at the call of the Executive Committee." [Motion carried.]

Motion to adjourn was then made and carried.

EDWARD C. KIRK,
Secretary-Treasurer.

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PHILADELPHIA, JUNE 1914.

EDITORIAL DEPARTMENT.

WEIGHED IN THE BALANCES AND FOUND WANTING.

WE are informed that the law enacted by the Legislature of Virginia and approved March 14, 1910, governing the practice of dentistry in that state, has been rescinded, or at least that portion of the law embraced in Section 2, which provided that "From and after January 1st, 1914, Anno Domini, the practice of this specialty in this state shall be a branch or specialty of medicine and surgery; and no person, after this act goes into effect, shall be given the examination or a certificate required by Section 4 of this act unless he shall first show to the satisfaction of the Examining Board provided herein that he has passed the examination provided by law for applicants to practice medicine or surgery, and has received from the Virginia State Board of Medical Examiners the certificate thereof as required by law to be given by them to such applicants." That is to say, the effort to define the nature and status of dentistry by legal enactment

and to make dentists out of physicians by the same scheme has met the fate of Belshazzar's kingdom by the analogous method of being weighed in the balances and found wanting.

How long must we suffer delays and obstruction to professional progress by the efforts of purblind enthusiasts who attempt to fit conditions to definitions rather than to adopt the plan of seeking the truth and defining it later in relation to practical results!

The section of the act herein quoted says: "From and after January 1st, 1914, the practice of this specialty [dentistry?] shall be a branch or specialty of medicine and surgery." Beautiful and reassuring as is the truth contained in this legislative pronunciamento, we cannot help asking, What was it before the act, or in what way has it been changed since the passage of the act, or how will it be changed after the reported repeal of the act that gave the dental profession in Virginia a new legal baptism and official designation? What has dentistry ever been, what will dentistry ever be, other than "a branch or specialty of medicine and surgery"? And can any conceivable legislative gyration ever make it anything else than that which it now is and ever has been—a department or specialty of the science and art of healing, *i.e.* that which we group under the inclusive general term, Medicine?

The attempt to legally re-arrange its character and relationships by legislative enactment suggest analogies with the attempt of a certain bucolic legislator who, under the impulse of painful memories of his earlier school-day mathematical experiences, introduced a bill into the legislature of his native state providing that the diameter of the circle should be exactly one-third of its circumference in order to avoid the practical inconvenience arising from the use of the four-decimal-place fraction inseparably related to *pi.* The bill in that case did not become a law as did Section 2 of the Virginia statute of March 14, 1910.

It seems evident that the purpose of the re-definition of dentistry in Virginia was to enforce the "medical education" of dentists by compelling the prospective applicant for dental license to get his dental education in a medical school. Here, again, is evidence of a fundamental misconception of the broader conception of the term medical. Is not everything taught in a properly con-

ceived and organized dental school, medical in its essence and its purpose? If not, why not? The dental school in which the therapeutic and prophylactic ideal does not dominate and color all of its teachings would be little more than a technical trade school.

Dental schools, then, as a matter of fact, are teaching medicine in so far as it is applicable to the specialty of dentistry, and the line of advance will be to improve and expand the medical ideals of dental teaching. The expectation that the highest efficiency in dental education and practice may be attained through the training afforded by the conventional medical curriculum is a futile one, because in brief terms the medical curriculum does not fit the demands of efficient dental practice. Nor can it be made to do so, for the self-evident reason that the trend of all educational curricula is toward adaptation to special ends, mainly utilitarian, and the medical curriculum will constantly evolve toward the ideal of making better physicians, while that of dentistry will develop toward making more efficient dentists—utilizing for that purpose all of the resources of medical science and art that are adaptable to its purposes.

The rescinding of the dental statute of Virginia is significant of the practical unsoundness of the principle of making dentists through the agency of the medical curriculum.

BIBLIOGRAPHICAL.

INTERSTITIAL GINGIVITIS AND PYORRHEA ALVEOLARIS. By EUGENE S. TALBOT, M.S., D.D.S., M.D., LL.D., Chicago. Pp. 335, with 102 illustrations. Price, cloth $4.00. Toledo, Ohio: The Ransom & Randolph Co., 1913.

The first edition of the work of which the second is before us was published in 1899, as a record of the author's investigations and an embodiment of his views upon the destructive inflammatory lesions of the retentive structures of the teeth commonly and erroneously classified under the designation "pyorrhea alveolaris," but for which the author proposed the more scientific and descriptive designation, Interstitial Gingivitis.

Dr. Talbot's findings with respect to the etiology and pathology of the lesions embraced within the scope of his designation have never received the thoughtful and sympathetic consideration by the dental profession at large to which we have felt that they were justly entitled. It is probable that at the time of their first publication Dr. Talbot's deductions from his scientific researches were not broadly understood by the dental profession because the conception of these gingival disorders at that time failed to include, generally speaking, a comprehension of their systemic relationships. In the intervening time, however, the definite relationship between pyorrhea and certain systemic states has been so clearly made out that the researches of Talbot are presenting themselves in a more understandable way, and are receiving more sympathetic consideration by students of the pyorrhea problem, both within and without the dental profession.

Briefly, the pioneer edition of Talbot's work is an example of a book born before its time, but it is gratifying to note that the time has now grown up to a comprehension of its meaning, and the work is one which should be familiar to all who pretend to an accurate knowledge of the subject of which it treats.

The first issue was marred by a number of errors and deficiencies which should have been corrected in the second edition, but it is regrettable that these defects have not been altogether eliminated in its successor. Thus, in the first chapter, devoted to the history of the literature on the subject, quotation is made from H. A. Fauchard, 1740. The footnote referring to the quotation refers the reader to *Independent Dental Journal,* 1875. The only Fauchard of which we have any record as writing in 1740 is Pierre Fauchard, the second edition of whose book was published in 1746, and we are unable to find any record of the "*Independent Dental Journal*" in 1875. Leonard Koecker, 1821, is recorded as "Kaecker," quoted from the *International Dental Journal,* vol. xiii. Toirac, who wrote in 1822, is incorrectly recorded as Joirac. The quotations from these authors should have been from original sources, or, if of necessity from secondary sources, the references should have been sufficiently

precise to enable the reader to find them without difficulty. At page 42, first edition, "prickle shells" is used where the phrase prickle cells is intended. In the embryology of the dental germ the phrase "dental shelf" is erroneously used to designate the dental sheath.

All of the foregoing typographical errors have been carried over from the first to the second edition. There are numbers of other instances of the same sort throughout the text which should have been eliminated by careful and intelligent editing.

The new edition has been amplified by the addition of some twenty-nine new illustrations, and the text has, generally speaking, been brought up to date, so that the number of pages is increased from 190 to 340.

The classification of the various forms of pyorrhea alveolaris as proposed by Rhein has been substituted for the classification by Fitzgerald, which latter was used in the first edition.

While opinions as to the validity of Dr. Talbot's findings will necessarily differ among students and observers, the book is so rich in its suggestiveness and in the matter of its scientific findings that no one who hopes to keep abreast of the literature of the subject can afford to be unfamiliar with its contents. The intrinsic value of the work is great enough to overbalance its typographical faults and clerical errors, but in justice to those whose work has contributed to the general knowledge of the subject and to which reference has been made by the author, a succeeding edition should be supplied with a full, complete, and accurate bibliography of the references quoted.

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Monatsschrift fuer Zahntechnik und Verwandte Gebiete*, Vienna, October 1913.]

IMPEDIMENTS IN SPEECH DUE TO DENTAL PROSTHESIS. By OSKAR SPIEGLER.

The insertion of prosthetic pieces, in many cases, produces alterations and impediments in speech, because the phonetic functions of the tongue, the lips, the palate, and the teeth have not been duly considered in the construction of the artificial substitute. The factors to be closely observed are as follows: Firm adhesion of the prosthetic piece, correct position of the teeth, separation between individual teeth, the weight of the prosthetic piece, the length of the palatal portion of the plate, and the final polish. If the fit of a plate is poor—viz, a space remaining between the palate and the plates—the language becomes guttural, and the patients' complain of dryness in the mouth, which is due to continuous swallowing. If the teeth are set up poorly, the language is considerably changed, and some letters, especially consonants, cannot be correctly articulated. The cause may be either too much or too little space for the tongue, viz, a tooth is longer or broader than is called for. Most disturbances in articulation are due to lack of space between the teeth. If we cover a normal denture with tin foil, it is impossible for the

owner to pronounce certain vowels and consonants, owing to lack of separation between the teeth. In artificial plates without separation between the teeth, the wearers are forced to expel the air required for forming certain sounds, instead of through the dental interstices, by placing the mandible in an abnormal position, which naturally impairs the hold of the plate, and incapacitates the patient to pronounce S, C, F, and Z correctly. If the plate is too heavy, patients, especially those who have to speak a great deal, complain of the excessive weight, which is very troublesome to them. The plate should be as long posteriorly as is compatible with good adhesion, but no longer. All decorations are to be tabooed. The plate should be carved and finished anatomically correctly.

In bridge work even greater care is indicated. A missing tooth should always be replaced by one of the size of the lost one, otherwise the tongue will discover and be impeded by the unnatural condition. The abutments must not be too high, and the anatomic shapes of the teeth must be accurately restored.

During the first few days following the insertion of a prosthetic piece, patients should be induced to read aloud a great deal, and to become less self-conscious by conversation, smoking, chewing sweetmeats, etc. Nausea produced by the first experience in wearing plates will be counteracted by rinsing with a mouth-wash, drinking of cold water, and deep breathing.

[*New York Medical Journal*, New York, March 21, 1914.]

TEETH AND HEALTH. EDITORIAL.

In a recent number of the *American Journal of the Medical Sciences*, Camac called attention to the importance of a more intimate co-operation between the physician and the dentist. There is little doubt that for many years the medical profession has assumed a somewhat superior position, and has refused to recognize the bearing that dental disturbances have upon the general health.

Anyone who takes the trouble to examine, even casually, the oral cavities of his patients will be astonished at the condition of the teeth. Although American soldiers have excited favorable comment on account of the tooth-brush being so much in evidence, yet the care of the mouth is neglected sadly by the community. So many teeth are gone that the proper mastication of food becomes impossible, and the individual is commonly underweight and anemic. In addition to this loss of mechanical value, there is the presence of the necrotic conditions that led to the destruction of the teeth. It may be called Riggs' disease, pyorrhea alveolaris, dental abscess, dental sepsis, etc., but the important point in common is the presence of pus in greater or lesser amount. If, as is not infrequent, two or three drams of pus, containing virulent streptococci, are secreted and swallowed every day, there must occur some disturbance of digestion. But there is an even more serious and dangerous possibility, that of localized collections of pus which cannot escape, and may therefore give rise to systemic infections, such as arthritis and endocarditis. Such a purulent condition anywhere else than around the teeth would be attacked most vigorously. No physician would permit an infected finger-nail to go untreated, yet the same man will calmly disregard a suppurating tooth and wonder why his treatment is not successful. Camac believes that consultations of the internist with the dentist are as necessary as those with the surgeon, a belief that is indeed warranted by the facts.

The foregoing free confession of delinquency on the part of physicians in relation to serious consideration of oral condition, and unqualified recognition of the vital importance of the dental factor in disease, is most encouraging to that dental practitioner who has learned to look beyond the merely technical part of his work.

[*Le Laboratoire et le Progrès Dentaire*, Paris, December 7, 1913.]

CROWNS UPON MOLARS WITH VERY DIVERGENT ROOTS. BY KRISCHENSKY.

Krischensky, in a communication which originally appeared in the *Bulletin de l'Amicale des Elèves et Anciens Elèves de l'Ecole Dentaire Française*, October 1913, suggests the following method for pivot crowns on upper first bicuspids and molars with very divergent roots.

Upper first bicuspids are prepared by grinding the tooth down to the cervical margin. The two canals are then enlarged with a reamer, and their apices filled. In the

lingual canal, a post is inserted of such length that it will protrude 2½ mm. above the gingival surface and a block of wax is built up around it of 3 cubic mm. diameter. The labial surface of this wax cube is rounded so as to leave a labial margin of about 1½ mm.; post and wax block are removed together, invested, and cast in gold. The post and block are then cemented on the tooth and oiled, and the rest of the tooth is built up in wax, after a post has been fitted in the labial canal, removed, invested, and cast in gold. If a Richmond crown is to be inserted, the gold block on the root is oiled, the facing fitted, the lingual and coronal portion built up in wax, withdrawn with the pivot in the labial canal, invested, cast, and cemented to the tooth, thus insuring great stability and resistance.

In three-rooted molars, the palatal root is treated in the manner described for first bicuspids, the post and cast gold block are cemented to the palatal root, the posts for the buccal roots are fitted parallel to one another and to the cast gold block, which is oiled. The crown is then built up in casting-wax, withdrawn with the buccal root pivots, invested, and cast in gold.

[*La Odontologia Argentina*, Buenos Aires, December 1913.]

CHRONIC ALVEOLAR ABSCESSES AND THEIR TREATMENT. By Dr. D. Rogers.

The prognosis of the treatment of chronic alveolar abscesses, in the writer's opinion, is favorable only in single-rooted teeth, while in multi-rooted ones it is not often possible to treat the roots satisfactorily. Extraction is indicated in the following cases: When the root-canals cannot be filled satisfactorily; when the length of the root is out of proportion with the bulk of the crown, and when the root is not quite firm; when the position of the tooth, as in cases of third molars, renders the likelihood of its preservation highly improbable; when the abscess involves the maxillary sinus, or the roots penetrate into the sinus and discharge pus into it; when the abscess is causing serious complications, and a great deal of tissue is carious or necrosed; and when the patient's general health does not permit of prolonged treatment.

In concluding, the writer states: Chronic alveolar abscesses require treatment because they constitute permanent foci of local and general infection. An accurate diagnosis of the condition of the roots and the periapical tissues must determine the process of treatment to be followed. The value of the radiograph in this diagnosis is unquestionable. The filling of the root-canals with an aseptic and stable material is of paramount importance. In the treatment of these abscesses the opening into the alveolus and curettage and amputation of the apex is of great value as a last resort.

[*Lancet*, London, March 28, 1914.]

AN INVESTIGATION INTO THE EFFECTS OF DRINKING-WATER UPON THE CAUSATION OF DENTAL CARIES IN SCHOOL CHILDREN. By J. B. Cook, Isleworth.

Ever since Carl Röse published his epoch-making treatise on "Deficiency of Mineral Salts and Degeneracy" (see Dental Cosmos, January 1909, p. 135), investigators of such note as Ferrier (see Dental Cosmos, February 1911, p. 242), Waller, Walkhoff, and others have studied the subject of the effects ot drinking-water of various chemical composition, such as is found in different communities and localities, upon calcification of the teeth and tendency or resistance to caries, and though the etiology of dental caries is still as obscure as ever, the fact that deficiency of calcium salts constitutes a contributing factor to caries is fully established.

Cook, from careful studies of the prevalence of caries in various English urban communities, which he has compiled in the form of instructive statistical tables, finds that the lower the general death-rate among the children the harder the water and the better the teeth, in the districts studied. These correlations indicate, in his opinion, an association between excessive softness of water and an increased amount of dental caries among the school children, and *vice versa*. The association is evident, but it must be remembered that the writer's inquiry deals only with urban districts; had it been possible to obtain reliable returns from rural districts, its value would have been considerably enhanced. The environmental conditions, so far as it was possible to measure them, do not seem to be a source of the relation between the hard-

ness of water and the amount of dental caries. It must of course be definitely and distinctly emphasized that these correlations and partial correlations merely call attention to an association between the nature of the drinking-water and the amount of dental caries, and must not be regarded as necessarily indicating cause and effect. Cook concludes that there may well be other factors at work which have a greater influence, but that this investigation is merely intended to draw attention to a hitherto neglected topic. As appears from the reviewer's introductory remarks, Cook is laboring under a misapprehension in regard to the priority of his investigation, which fact, however, does not detract from its value as corroborative evidence.

[*La Stomatologia*, Milan, July 1913.]

THE ACTION OF HEAT AND COLD ON THE TEETH. BY DR. R. BABINI.

In order to determine the effect of sudden thermal changes upon the teeth, especially in regard to causing predisposition to dental caries, the writer has conducted a series of tests with partly formed deciduous teeth, young deciduous teeth with widely open apical foramina, and permanent teeth. Some of these teeth were newly extracted, others had been kept for years; again others came from cadavers, and some from healthy or sick living individuals. Special care was taken to select only teeth with uncracked enamel. These teeth were alternately put in boiling water and in snow at from one to two minutes' intervals. After from 15 to 20 minutes, no trace of cracks could be noted upon most careful examination. Neither the hardness, viz, resistance to a cutting instrument, nor fragility of the teeth, viz, resistance to hammer blows applied under identical conditions and of mechanically regulated intensity, made any difference in regard to the effect upon the sudden thermal changes upon the various teeth. Dilatation and contraction, therefore, does not seem to have any appreciable influence upon the molecular tension of the tissues, viz, Nasmyth's membrane, enamel, and dentin, that make up the tooth.

The writer does not believe that vital teeth would be differently affected by these tests, because, in the first place, the thermal changes in the mouth are never as great as were these in the tests; in the second place, the metabolism in fully formed teeth is almost *nil*, so that the sensations of heat and cold, when communicated to the hard tissues by way of the pulp, cannot be of great influence. It is easily understood, of course, that thermal differences produce vaso-dilatations and vaso-constrictions in the pulp and concomitant pain, but no action upon the dentin or enamel can be exerted thereby.

Not so with the soft tissues. In the peridental tissues, sudden thermal changes cause circulatory disturbances and inflammations.

Cracks in the enamel and fractures of the dentin are to be attributed to excessive efforts at incision, and are especially notable in individuals with close bite. The liability to fracture is enhanced by the dryness of the enamel in mouth-breathers. Hypercalcification of the dentin also may be a contributing factor, as it decreases the elasticity of the dentin. Fractures are therefore noted most frequently in adults, in whom simultaneously with the diminished elasticity of the dentin, the enamel prisms have a less elastic support and break more easily.

While the above investigation is interesting, it is to be regretted that the writer has not made microscopic sections to prove the absence or possible presence of some minute tissue changes, and that only teeth with perfectly intact enamel were employed in these rather too empirical tests.

[*Oesterreichische Zeitschrift fuer Stomatologie*, Vienna, Nov. 11, 1913.]

THE RÔLE OF THE SALIVA IN HEALING PROCESSES IN THE MOUTH. BY DR. B. GOTTLIEB AND DR. H. SICHER.

It has not yet been satisfactorily explained why, in spite of the presence of innumerable micro-organisms in the mouth, healing by first intention usually takes place in lesions of the oral cavity. Investigations in regard to the bactericidal action of the saliva or any of its constituents have yielded no definite results. The writers, therefore, have conducted tests by extirpating the parotid, submaxillary, and sublingual glands and ligating the ducts of both parotids in a dog. In this dog, which secreted no saliva, as well as in a normal control animal, both living under the same conditions, simple wounds of the mucous membrane, bruises of the gingival tissue, and bone

wounds were produced, and the healing process was closely observed. Although smears showed that the wounds in both dogs were infected with numerous cocci and bacilli, the healing process in both was absolutely identical, and without complications.

This test seems to prove that in healing processes in the mouth, the saliva, if any, plays only a very minor part.

[*Zahnaerztliche Orthopaedie und Prothese*, Munich, February 1914.]

PHYSICAL LAWS IN ORTHODONTIA. By Professor W. Pfaff, Leipzig.

The writer emphasizes the necessity of an accurate knowledge and thorough appreciation of the physical laws to which orthodontia appliances are subject, explaining by practical examples how force and resistance are to be calculated, and how undesirable movements can be prevented *a priori*. Our orthodontia appliances exert only two forces, viz, traction and pressure. After discussing the expansion arch, ligatures, springs, screws and wedges, the writer illustrates his contentions with very fine plates. He also discusses the new Angle arch, which prevents tipping of the teeth and does away with ligatures. By soldering the pins to the arch, however, he finds that the arch loses in elasticity, and that in moving the arch forward, the spurs may easily be bent at the soldered spots. Moreover, the point of exertion of the force is not situated as high as in the Case arch, so that the movement is a slower one. If the tubes are not situated accurately in the middle axis of the tooth, rotation of the teeth will occur. On the other hand, single teeth can be rotated much more easily with this arch than with any other appliance.

[*Anales de la Sociedad Dental de la Habana*, Havana, February 1914.]

CONTRIBUTION TO THE STUDY OF PYORRHEA ALVEOLARIS. By Frank E. Hart.

While the writer adds nothing new to the etiology of pyorrhea alveolaris, his treatment is of interest. The patient is advised to have his urine analyzed, and, if found necessary, constitutional treatment is given by the examining physician. The loose teeth are first ligated with silk ligatures. After washing with an antiseptic, the gingival pockets are tamponed with gauze impregnated with a 25 : 100 solution of pheno-sulfonic acid, and the patient is dismissed for twenty-four hours. The following day, the teeth are scaled, with the ligatures still in place, thereby making the scaling process less painful. The silk ligatures are then removed, and replaced by gold wire. Each pocket is injected with a few drops of the following solution: Iodin, 0.50; phenol, 2.00; tincture of aconite, 6.00; glycerin 100.00 gram. The pockets are then again tamponed with phenolated gauze. A mouth-wash of 3 : 100 sodium perborate or a solution of ½ : 100 phenosalil combined with tincture of arnica 8 : 100, and laudanum 5 : 100 is also prescribed. If, in scaling and tamponing, blood impedes a clear view of the field of operation, the hemorrhage is arrested by a solution of iodin in chloroform 6 : 100, or in refractory cases by the application of adrenalin. Treatment of the pockets is repeated every three days for a period of from five to six weeks. In some cases, cures of as much as seven years' standing have been effected, though in others a relapse was noted after a few years.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, October 1913.]

CONGENITAL SYMMETRICAL PLICATE TONGUE. By Dr. E. Urbantschitsch, Graz.

Of the organs of the oral cavity, the tongue has probably received the scantiest consideration by stomatologists, although anomalies like the one described by the writer are not very rare. Urbantschitsch has compiled the meager literature on plicate tongue, and has added to it a goodly number of personal observations, which are reproduced in beautiful half-tones. The anomaly in question, which is characterized by numerous more or less asymmetrical grooves and furrows of various length and depth on the dorsal surface of the tongue, giving it a strange furrowed appearance, has been designated by various terms, most generally as plicate, cracked, fissured, or wrinkled tongue.

Among 1000 tongues examined, the writer has found 55 cases of plicate tongue, 36 in males, 19 in females. Differential diagnosis must be made between this anomaly and so-called "geographical tongue," and glossitis of syphilitic or any other pathological origin.

Two forms of this anomaly may be dis-

tinguished; the tongue is either divided by furrows more or less parallel to the median furrow, or the median furrow is of only rudimentary development, and the anomalous furrows consist of parallel arcs, the center of which lies at the apex of the tongue. Plicate tongue is always congenital, and occurs in about 0.5 per cent. of cases, more frequently in men; but usually it remains unobserved. Trouble is experienced only in very rare cases. The anomaly is usually transmitted from the father to the eldest male descendant, less frequently to the daughters. Macroglossia need not be present, nor geographical tongue, although either affection is frequently concomitant with it. It is probable that infections of the tongue occur more easily in these cases. Generally no inconvenience is caused by this anomaly; if pain is present, repeated painting of the sore portions with iodin and glycerin will produce rapid relief.

[*L'Odontologie*, Paris, March 15, 1914.]

CARE OF THE VULCANIZER. BY CH. BENNEJEANT.

The oxidation of the lower surface of the pot due to the action of the flame or to impurity or incomplete combustion of the gas is only superficial and affords some protection, so that too much cleaning is contra-indicated.

Rusting of the steel parts is overcome by some practitioners by greasing with various oils. This practice is reprehensible, since the fatty acids in these oils attack copper, and in brass produce bluish-green discoloration; the copper salts in turn produce a discoloration of the iron, giving the vulcanizer an unsightly appearance. It is better to varnish the steel parts with a thin coat of hot melted beeswax or paraffin, avoiding all contact with the brass portions, which are kept clean by the use of one of the numerous polishing pastes in the market.

The water in the pot should not reach above the lower half of the flask, because otherwise the salts dissolved by the water from the plaster will attack the pot and the flask. To overcome the formation of crusts, a small quantity of carbonate of soda, or of lime, 0.25 gram per one liter of water, should be added to the water.

Owing to the uneven heating of the steel and copper parts, a thermo-electric current is produced, which sometimes reaches 6.7 milliampères. The fact of the presence of this current may account for electrolytic action upon the steel parts and the cast metal of the flask. To overcome this action, the flask should be set on an earthenware saucer, which will also prevent overheating during the process of vulcanization. The electrolytic action of this current used to injure the solder in old-style vulcanizers; for this reason, modern vulcanizer pots are made in one piece.

From the process of vulcanization, copper sulfid is formed, which gradually covers the inside of the pot with a black layer; it is useless to remove this, as it is insoluble and forms a protection for the pot.

The flasks should never be oiled, for the same reasons as mentioned in connection with the oiling of the fittings of the pot. The halves of the flask can as easily be separated if varnish instead of oil is used; varnish, moreover, is cleaner, and does not spoil the hands as much as oil.

Pot packings of lead will last a long time, if they are cleaned before each use with a soft brush. To get the packing in its proper place, the cover and pot should be fitted with guide pin and slot.

It is not necessary to spread it by clamping it down tightly, as the expansion of the metal with heat will produce a steamtight joint. When the packing is defective, it can easily be repaired by casting fresh lead into the groove. Any excess is removed with an old file and by shutting the pot tightly while the lead is still hot.

In many vulcanizers the manometer and blow-off are held in place with nuts covered with a waterproof paste for the purpose of tightening the joint. This paste gradually wears out, but can be replaced by a mixture of two parts linseed oil, two parts protoxid of lead, 50 parts of very fine iron filings, and two parts of pulverized ammonium chlorid. These ingredients are vigorously stirred together, and painted upon the joints, which have been previously touched with linseed oil. In a day or two, the paste is dry, and the joint tight again.

The manometer or steam gage does not require any special care on our part; if out of order, it should be repaired by a specialist.

The thermometer should be wiped while still hot; sudden changes in temperature must be avoided.

PERISCOPE.

Keeping Carbolic Acid Liquid.—A few drops of alcohol in the carbolic acid bottle keep pure crystallized carbolic acid in a liquid form.—B. W. NEAVE, *Commonwealth Dental Review.*

Removing Grease Stains.—Grease stains may be removed from cloth with benzin, ether, chloroform, or carbon tetrachlorid. The latter is non-inflammable and is therefore the safest to use.—*Popular Mechanics.*

Preventing the Buckling of Gold Plates.—To prevent the buckling of gold plates in swaging, a slit is cut at the median line, from the margin to the ridge, lapped over, and, when swaged, soldered. This should be done in all cases, as this is the weakest point and the plate breaks there. By doing this, the weak point is doubled in strength.—L. P. HASKELL, *Dental Review.*

Mending Broken Oilstones.—A broken oilstone can be repaired so that it will last until the stone wears out, in the following manner: The pieces are first heated on an iron plate to remove all oil, then thoroughly cleaned. The surfaces to be joined are well dusted with powdered shellac, which is melted by heating in the same manner. The parts are then placed together and tightly clamped until they become cool. The joints thus made will not interfere with the honing surface.—*Popular Mechanics.*

Prevention of Thumb-sucking.—The tiniest infant is never too young to be taught, if a tendency to thumb-sucking is seen. If the infant is but a few weeks old, and thumb-sucking is begun, the sleeves of the little dress should be pinned to the coverlet, which is not a great hardship, as at this age the infant cannot move much. Later on, when this method must be discontinued, and if the habit is still persisted in, the hand should be kept constantly closed in little linen bags tied securely to the wrist.—C. E. KELLS, *Oral Hygiene.*

Restoration of Occlusion in Large Amalgam Fillings.—If a large restoration is to be made, the occlusion and the movements of the mandible should be studied carefully, and, if necessary, a wax or modeling compound bite should be taken and plaster casts should be run for study models. A hasty filling of temporary stopping, allowing the patient to close the teeth while the material is still plastic, will show any abnormal condition of bite, which can be allowed for in the amalgam restoration. In amalgam work the rubber dam is seldom indicated, as so many of the fillings extend below the gum. Cotton rolls and a saliva ejector are perfectly adequate except in rare cases.—W. R. POND, *Items of Interest.*

Wax-Gold Inlay.—A spatula full of hot inlay wax is melted into mat gold, and the impression of the cavity is taken in the same way as with wax. The wax-gold impression is removed when cooled, and invested in any good inlay or bridge investment completely, except a small place of about four mm. in diameter, through which to flow solder. After the investment is dry, it is placed on the fire and heated up, keeping the heat underneath the investment all the while. The solder is cut into strips, and when the matrix is hot enough the solder is flowed in. This is a very practical method of utilizing mat-gold scraps. This method was taught in 1895 by Dr. Emery Ballon, of Dodge City, Kans.—D. D. CAMPBELL, *Dental Summary.*

Volume Changes of Amalgams.—J. Würschmidt has made studies of the expansion of amalgams. In the case of tin amalgams the coefficient of expansion begins to increase below the melting-point, and has its maximum value at the melting-point. So sharp is this that the property can be employed for determining the melting-point. In the case of zinc amalgams the maximum value of the coefficient of expansion is found below the melting-point, but it was found that the coefficients of expansion depend on the past history of the amalgam. The maximum of the coefficient is caused by time changes of the volume. Bismuth amalgam, like pure Bi, shows a contraction at the melting-point, but this contraction begins far below the melting-point, and reaches its first maximum at 90°.—*Deutsch. phys. Gesell.*, Verh., per *British Dental Journal.*

Gum-section Repairs.—When a well-made and clean-jointed gum-section plate is to be repaired, the conscientious dentist frequently undertakes to repair it with much misgiving, knowing that probably it will come from the vulcanizer with stained joints. To overcome this difficulty, one should first see that the boiler and lid are washed out, then a little calxine cement is taken and the exposed joints are carefully covered with it. If the cement is mixed thin and allowed to set, the plate will come out nice and clean. It is always well to remove the plate from the vulcanizer and plaster as soon as convenient after cooling. A little calxine applied at the front and back of the joints of new work also insures a clean joint.—S. BRADDOCK, *Commonwealth Dental Review.*

Central Cracks in Vulcanite Upper Dentures.—Many causes may produce often-recurring cracks in or near the middle line in vulcanite dentures. The commonest and most obvious is the gradual absorption and subsidence of the alveolar ridge, leaving the plate to rock on the palate; something has to give way and the plate either bends or cracks. A similar result may follow an increase in the size in the ridge due to inflammation. There are, however, causes less obvious and much more difficult to detect. In a case reported a lady aged over fifty erupted an incisor in the middle of the front part of the palate. Before the untimely thing declared its nature, the dentist was puzzled to distraction by the constant loss of fit, followed by a median crack in the upper plate.—*Brit. Journ. of Dental Science.*

The Selection and Application of Flux in Soldering Operations.—Borax can be used in two forms, viz, as a vitrified powder obtained by driving off the water of crystallization from ordinary borax, and calcining the resultant clear mass, and as a mixture with water made by rubbing a piece of borax on a moist slab. Each of these has its good points. The powder being thoroughly dry, does not swell when heat is applied to it, so that even if it should manage to get in between a tooth and its backing no crack will result; here it is distinctly better than its ordinary moist rival. A combination of the two, however, seems to answer best. The surfaces to be soldered, having been thoroughly cleaned, should be sparingly painted with some of the moist borax mixed very thick, care being taken not to touch the investment, and over this some of the powder should be dusted. The piece may then be dried and soldered in the usual way, and if any more flux be required during the operation, the powder should obviously have the preference.—G. J. GOLDIE, *Ash's Canadian Monthly Circular.*

Easy Method of Coating Models with Tin Foil Before Vulcanizing.—After the case is packed with rubber, boiled, and the flask and the bolts have been tightened, the case is allowed to set a minute or two, and then the bolts are loosened. The halves of the flask are separated, the piece of starched linen that covers the rubber when bought being used as a separating medium, so that the upper portion will not adhere to the model. The excess of rubber is trimmed off. On the model in the other half of the flask, a whole sheet of No. 10 tin foil is burnished. No attempt should be made to trim off the excess of tin foil, for in so doing one is liable to distort the rest, and the surplus will not hurt, but rather provides a vent, allowing the excess rubber to ooze out. After the tin foil is well burnished the half of the flask containing the teeth and rubber is placed in position over the tin-foiled side. The flask is then closed and boiled, the bolts are tightened, and the case is then ready to be vulcanized.—C. S. KILE, *Western Dental Journal.*

Difficult Artificial Dentures.—Not an uncommon condition in artificial dentures is found when both upper and lower jaws are flat, especially when the upper is short and narrow and the lower broad.

While I have found no necessity for vacuum chambers in flat upper jaws for securing adhesion, there is a tendency of the plate to slide forward if there are no tuberosities to prevent it.

On the lower flat jaw, absorption has taken place until the lingual muscles are attached to the margin of the jaw, and often a mass of loose membrane rises high above the margin of the jaw, so that the plate cannot be worn if extended over the margin, as the tongue constantly lifts it, and the result is that the plate slides forward.

Under these conditions a serious difficulty arises in taking the bite as the upper plate slides forward. The only way to meet this difficulty is to make use of the vacuum chamber, as it will prevent the sliding of the plate to a considerable extent.

Another difficulty in these cases lies in the arrangement of the teeth, the lower jaw being so much broader. This illustrates the folly of the idea that the posterior teeth in the upper jaw must be placed over the ridge, for it would be impossible to secure proper occlusion, to say nothing of the narrow space for the tongue.—L. P. HASKELL, *Dental Brief.*

Prosthetic Castings.—Nearly all prosthetic castings should be made in combination with iridio-platinum or gold in wire or plate form as a means of reinforcement.

Iridio-platinum, on account of its great strength and freedom from oxidation, affords the best reinforcement.

24-karat gold reinforced with iridio-platinum is the best for inlay abutments.

The reinforcement plan expedites as well as strengthens the work and obviates bulkiness, which is so essential in many instances.

It is best not to heat any alloy of gold containing base metals to the point of oxidation when casting upon it.

It is unnecessary and detrimental to heat a flask to a red heat or anywhere near it when burning out wax.

The elastic limit of scrap or junk gold is practically *nil*, and it should not be used where much strain will be brought to bear upon it.

Alloys of gold with platinum will become very brittle when cast a few times; this, Dr. Taggart tells us, is due to contamination with silica contained in the investment.

The casting process makes possible the employment of almost all forms of porcelain teeth, and provision should be made for cementation rather than casting directly on to the porcelain.

Nearly all inlay abutments, regardless of size and shape of cavity, should have some form of supplemental pin anchorage.—F. E. Roach, *Dental Summary*.

Cleft Palate.—Ochsner, in *New Orleans Medical and Surgical Journal*, April 1913, observes that certain principles should be kept in mind. These are absolute relaxation of flaps so as to obviate tension, a good blood supply for these flaps and a proper and broad coaptation of raw surfaces. When the palatal arch is high or of the Gothic type, it may suffice to build the muco-periosteal flap from the cleft without lateral incisions, but when it is low or of the Norman type, these incisions usually become necessary. He quotes Ranzi to the effect that in sixty-one operations for cleft palate, most of which were done by the Lane or Langenback-Billroth methods, there were ten deaths, a mortality of 15 per cent. All of the deaths occurred in those of two years of age or under; 31.5 per cent. of those under two years of age were cured, while of those operated on after the second year, 71.4 per cent. were cured. Ochsner used the Langenback method, doing the operation at two or more sittings. The muco-periosteal flaps are made at the first operation, thus allowing for the proper regeneration of blood supply. Cure under one operation was not the rule. A linen suture is used, and post-operative vomiting is encouraged by giving the child as much water as it will drink. Also purgatives should invariably be given the night of the operation or the next morning. The mouth is bothered as little as possible. Although an absolute closure of the defect does not guarantee perfect speech, the accomplishment of this is at least a possibility, even though the operation be done late. Ochsner, however, advises long after-training.—*Therapeutic Gazette*.

Tooth Wax for Taking Bites.—It is not generally known that tooth wax—this is the black wax on which pin teeth are usually mounted—can be utilized for taking bites. This is carried out in the following manner:

A sufficient quantity of the wax is placed in lukewarm water; it soon becomes sufficiently soft to be applied to the alveolar processes on the pink wax, or preferably on modeling composition, for the bite. It is easily molded into shape, which should be cubical wherever possible, and made to adhere to the composition by gently applying a heated knife or spatula to the labial and lingual sides.

When edentulous jaws are being dealt with, the composition is built up for the lower jaw in cone shape, with two or three cuts on the surface of it; the tooth wax, which is fixed only for the upper jaw, then descends on to the cone-shaped composition of the lower, and gives the bite.

This tooth wax possesses every advantage over other materials; it remains soft much longer, and the bite is more certain. If water is not at hand, a gas or spirit flame will serve, if used carefully, to soften the wax; but it is not as clean as water.

The patient's bite is controlled by the dentist. The patient is told to close the mouth slowly, and the dentist allows the closing to go only far enough to define the facial expression—allowing for muscular movement, sympathetic generally. This applies chiefly to edentulous jaws.

In cases in which there are antagonizing or articulating teeth, the patient cannot, of course, bite too deeply into the wax.—Prof. Schroeder and Val Ray, *Ash's Monthly*.

HINTS, QUERIES, AND COMMENTS.

AMMONIUM FLUORID NOT DANGEROUS TO TOOTH STRUCTURE.

On page 389 of the DENTAL COSMOS for March 1914 is quoted an editorial of the *Nebraska Dental Journal,* saying: "An extracted tooth immersed in a solution of ammonium fluorid, taken from bottles labeled as such and sold to the dental profession, will be completely denuded of enamel in from four to eight hours."

After reading this very surprising statement I immersed an extracted tooth in ammonium bifluorid—Tartasol—for eight days—about twentyfold more than eight hours—and on removing it from the liquid I found nothing gone but some tartar which had been on it.

I then tested its capacity to dissolve tartar by immersing in it for twenty-four hours a tooth which had tartar upon it—with the result that the tartar, though still attached to the tooth, broke away on slight pressure. I think this is all Dr. Head claims for it—that it will loosen the hold of tartar on the root in a few days, but not thoroughly dissolve it.

Is it not possible that some druggist had substituted nitric acid for ammonium fluorid in the case referred to in the *Nebraska Dental Journal?*

STEWART J. SPENCE.

Chattanooga, Tenn.

OBITUARY.

DR. VINES EDMUNDS TURNER.

[SEE FRONTISPIECE.]

DIED, May 11, 1914, at his home in Raleigh, N. C., of edema of the lungs and heart failure resulting from diabetes mellitus, VINES EDMUNDS TURNER, D.D.S., in the seventy-eighth year of his age.

Dr. Turner was born in Franklin county, N. C., January 21, 1837. He attended the high school at Henderson, N. C., in preparation for college, but abandoned the plan in order to assist his father in the hardware business. At the age of nineteen years he began the study of dentistry at the Baltimore College of Dental Surgery, from which institution he was graduated with the degree D.D.S. in March 1858. He began the practice of his profession at Henderson, N. C., continuing there until the outbreak of the civil war. He entered the Confederate army June 11, 1861, as a second lieutenant of infantry; was promoted to adjutant of the 23d North Carolina regiment in 1862, and to a captaincy in 1863, and was serving on the staff of Major-general James A. Walker at the time of the surrender of General Lee at Appomattox. He was wounded in the battle of Cold Harbor in 1862, and went through all the campaigns of the Valley of Virginia under Generals Jackson and Early.

Locating at Raleigh, N. C., at the close of the war, Dr. Turner began a career in which his strong personality, his enthusiasm, and his active interest combined to make an impression upon dental professional affairs not only locally, but nationally, which continued without interruption up to the time of his decease. All through his long professional life Dr. Turner was an enthusiastic dental society worker and active in the administration of the affairs of the societies with which he was affiliated, in which con-

nection his wise counsel and his influence for good were actively sought; and his helpfulness through these channels served to raise the ethical and professional standards of dentistry.

Dr. Turner's personality was characteristic. There are those from whose very presence emanates a continuous influence for good. To that class Dr. Turner belonged; courteous, considerate, sympathetic in all of his professional relations, and with a keen sense of personal honor, he constantly exerted these admirable personal characteristics in influencing the activities of his colleagues toward the right. Perhaps no man in his region or throughout the South had a larger circle of genuine friendships. In him the spirit of Abou ben Adhem was continually manifest, for his loyalty not only to his friends, but to the profession which he honored, sealed all of his relationships both personal and professional with a stedfastness which was as beautiful as it is rare. That his colleagues appreciated his character and service is evident from the number of honorable positions which came to him as expressions of the faith of those whom he served.

Dr. Turner was a charter member and twice the president of the North Carolina Dental Society, and for more than a generation had been president of the North Carolina Board of Dental Examiners; he was a member and at one time president of the Southern Dental Association; he served as president of the National Association of Dental Examiners in 1901, and as one of the vice-presidents in the dental section of the Ninth International Medical Congress; he was state chairman and one of the members of the reception committee of the Columbian Dental Congress at Chicago, and a member of the committee on organization of the Fourth International Dental Congress, in St. Louis, in 1904. He was a member of the National Dental Association, and its treasurer from 1904 to 1906; he was elected to the presidency of that body at Boston in 1908. He was also appointed by President Woodrow Wilson, in April 1913, assistant dental surgeon, Dental Reserve Corps, U. S. army, and member of the examining board of dental surgeons of the Dental Reserve Corps. He was president and director of the Raleigh Street Railway Co., and a director for eight years in the North Carolina Railroad Co. For upward of a quarter of a century he was a director of the Raleigh Savings Bank. Dr. Turner was a democrat in politics, was a Mason, and a member of the Episcopal Church.

He was married in September 1868 to Miss Rosena Lassiter, who died in May 1869. In 1874 he married Miss Love Gales Root, from which union there were three children, Professor Charles R. Turner, D.D.S., M.D., of the University of Pennsylvania, Mrs. H. M. Wilson of Raleigh, N. C., and Henry G. Turner, M.D., a practicing physician.

It is difficult if not impossible for one who bore to Dr. Turner the close personal relationship so long enjoyed by the writer, to express in a formal notice of his life and professional activities an estimate of the beauty of his character as it was manifest in his more intimate relations of friendship and family life—nor is it perhaps proper to attempt to do so; yet simple justice to a beautiful character and an honored memory may surely excuse the statement that those who were privileged to be admitted to his inner heart circle feel that to have known and loved him was not only a rare privilege, but an uplifting experience that tempers the sorrow of his loss in the realization that he has left to us the inspiration toward a better and nobler life by living that life himself.

He died as he had lived, a Christian gentleman, surrounded by the members of his family. The interment was made at Raleigh on Tuesday, May 12, 1914.

DR. FERDINAND J. S. GORGAS.

Died, April 8, 1914, in Baltimore, Md., of paralysis and heart failure, in his eightieth year, Ferdinand J. S. Gorgas, A.B., A.M., D.D.S., M.D.

In the demise of Dr. Gorgas, which occurred in Baltimore, Md., on April 8, 1914, the dental profession has lost a very notable practitioner, energetic teacher, and well-known writer on subjects pertaining to dental practice and science.

Ferdinand J. S. Gorgas was the son of John DeLancy Gorgas and Mary Ann Gorgas, born in Winchester, Va., on July 27, 1834. He received his early education in the public schools of Carlisle, Pa., and in due course of time attended the Dickinson grammar school and the Dickinson College, from which institution he received the degrees of A.B. and

A.M. Upon finishing his college course, the deceased matriculated in the Baltimore College of Dental Surgery in 1854, and after receiving the degree of D.D.S., took up the practice of dentistry in Madison, Ind., and later in Harrisburg, Pa. Desirous to broaden his already remarkable knowledge, he took up the study of medicine in the Medical Department of the University of Maryland, receiving the degree of M.D. in 1863.

Dr. Gorgas occupied the positions of professor and dean of the Baltimore Dental College from 1867 to 1882, and that of dean of the Dental Department of the University of Maryland from 1882 to 1911, where he held, at the same time, the chairs of prosthetic dentistry, oral surgery, and dental medicine. He was editor of the *American Journal of Dental Surgery*, of "Harris' Principles of Practice of Dentistry," and Harris' Dental Dictionary, which underwent six editions. Dr. Gorgas was the author of the text-book on "Dental Medicine," of which eight editions have appeared, and of "Questions and Answers for Dental Students." He was a member of the Maryland State Dental Association.

Dr. Gorgas married Miss Anna Elizabeth Swormstedt, at Madison, Ind., from which union two sons, Dr. L. D. Gorgas of Chicago, Ill., and Dr. H. F. Gorgas of Baltimore, Md., survive. His second wife was Miss Sarah P. Swartz of Baltimore, Md.

Interment was made in Greenmount Cemetery, Baltimore, Md.

MR. JOSEPH JOHNSTON ADGATE.

Joseph Johnston Adgate, manager for a number of years of the uptown New York branch of the S. S. White Dental Mfg. Co., died of intestinal trouble, in Mount Vernon Hospital, New York, N. Y., February 27, 1914. Mr. Adgate was in his fifty-fourth year, and he had spent nearly forty years in the service of the Company. Beginning as an errand boy, he rose, by faithful, intelligent attention to duty, to the responsible position he occupied at the time of his death. His long service with the New York house brought him into close and frequent contact with its patrons, among whom his knowledge, his understanding, and his ready helpfulness made him many firm friends, who will sincerely mourn his untimely death.

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS:

June, July, and August.

JUNE.

American Medical Association—Section of Stomatology. Atlantic City, N. J. Five days: June 22d to 26th.

California State Dental Association. Camp Curry. Four days: June 29th to July 2d.

Colorado State Dental Association. Manitou. Three days: June 25th to 27th.

Georgia State Dental Society. Atlanta. Three days: June 4th to 6th.

Louisiana State Dental Society. Baton Rouge. Three days: June 4th to 6th.

Maine Dental Society. Augusta. Three days: June 25th to 27th.

Mississippi Dental Association. Vicksburg. Three days: June 23d to 25th.

Montana State Dental Society. Great Falls. Three days: June 8th to 10th.

N. D. A.—Southern Branch. Atlanta, Ga. Three days: June 4th to 6th.

New Hampshire Dental Society. Weirs. Three days: June 17th to 19th.

North Carolina Dental Society. Hendersonville. Four days: June 24th to 27th.

Northern Ohio Dental Association. Cleveland. Three days: June 4th to 6th.

Pennsylvania State Dental Society. Philadelphia. Three days: June 30th to July 2d.

South Carolina State Dental Association. Chick Springs. Three days: June 17th to 19th.

TENNESSEE STATE DENTAL ASSOCIATION. Chattanooga. Three days: June 25th to 27th.

JULY.

AMERICAN DENTAL SOCIETY OF EUROPE. Paris. July 30th to August 1st.

AMERICAN SOCIETY OF ORTHODONTISTS. Toronto, Can. Three days: July 2d to 4th.

DELTA SIGMA DELTA FRATERNITY. Rochester, N. Y. July 6th.

FLORIDA STATE DENTAL SOCIETY. Atlantic Beach. Three days: July 1st to 3d.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS. Rochester, N. Y. July 6th.

NATIONAL DENTAL ASSOCIATION. Rochester, N. Y. Four days: July 7th to 10th.

NEW JERSEY STATE DENTAL SOCIETY. Ocean Grove. Four days: July 15th to 18th.

TRI-STATE DENTAL ASSOCIATION [DISTRICT OF COLUMBIA, MARYLAND, AND VIRGINIA]. Buckroe Beach, Va. Three days: July 23d to 25th.

VIRGINIA STATE DENTAL ASSOCIATION. Old Point Comfort. Three days: July 1st to 3d.

XI PSI PHI FRATERNITY NATIONAL ALUMNI ASSOCIATION. Rochester, N. Y. July 6th.

AUGUST.

MINNESOTA STATE DENTAL ASSOCIATION. Duluth. Three days: August 6th to 8th.

SIXTH INTERNATIONAL DENTAL CONGRESS. London, Eng. Six days: August 3d to 8th.

Examiners' Meetings.

ALABAMA BOARD OF EXAMINERS. Selma. June 2d.

ARKANSAS BOARD OF EXAMINERS. Little Rock. June 8th and 9th.

CALIFORNIA BOARD OF EXAMINERS. San Francisco, June 5th. Los Angeles, June 17th.

CONNECTICUT DENTAL COMMISSIONERS. Hartford. June 18th to 20th.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS. June 1st to 4th.

FLORIDA BOARD OF EXAMINERS. Jacksonville. June 26th to 30th.

IDAHO BOARD OF EXAMINERS. Boise. July 1st.

ILLINOIS BOARD OF EXAMINERS. Chicago. June 11th.

INDIANA BOARD OF EXAMINERS. Indianapolis. June 15th to 19th.

IOWA BOARD OF EXAMINERS. Iowa City. June 1st.

MAINE BOARD OF EXAMINERS. Augusta. June 23d and 24th.

MASSACHUSETTS BOARD OF REGISTRATION. Boston. June 3d to 5th.

MICHIGAN BOARD OF EXAMINERS. Ann Arbor. June 15th to 20th.

MISSISSIPPI BOARD OF EXAMINERS. Jackson. June 16th to 18th.

MONTANA BOARD OF EXAMINERS. Helena. July 13th to 17th.

NEVADA BOARD OF EXAMINERS. Carson City. June 27th.

NEW JERSEY BOARD OF EXAMINERS. Trenton. June 29th to July 1st.

NORTH CAROLINA BOARD OF EXAMINERS. Hendersonville. June 22d.

NORTH DAKOTA BOARD OF EXAMINERS. Fargo. July 13th to 16th.

OHIO STATE DENTAL BOARD. Columbus. June 16th.

OKLAHOMA BOARD OF EXAMINERS. Oklahoma City. June 11th.

PENNSYLVANIA BOARD OF EXAMINERS. Philadelphia and Pittsburgh. June 10th to 13th.

PHILIPPINE ISLANDS BOARD OF EXAMINERS. Manila. July 7th.

SOUTH CAROLINA BOARD OF EXAMINERS. Chick Springs. June 12th.

SOUTH DAKOTA BOARD OF EXAMINERS. Sioux Falls. July 7th.

TENNESSEE BOARD OF EXAMINERS. Nashville. June 15th to 19th.

TEXAS BOARD OF EXAMINERS. Dallas. June 22d.

VERMONT BOARD OF EXAMINERS. Montpelier. June 29th.

WISCONSIN BOARD OF EXAMINERS. Milwaukee. June 22d.

NATIONAL MOUTH HYGIENE ASSOCIATION.

A SERIES of illustrated lectures on Mouth Hygiene is being prepared by this association for rental service. The first lecture of the series, a talk suitable for a mixed adult audience or school pupils above the age of twelve years (designated as lecture "A") is now ready. The lecture set (manuscript and 36 slides) will be furnished to members of state dental societies and others who may be considered as competent to present the matter to the public, at a fee of One Dollar per use.

For further particulars and application blanks, address the Director of Extension Lectures,

EDWIN M. KENT, D.M.D.,
222 Washington st., Brookline, Mass.

National Dental Association Meeting.

Rochester, N. Y., July 7–10, 1914.

THE National Dental Association will hold its 1914 meeting in Rochester, N. Y., July 7 to 10, 1914. The House of Delegates will hold its first session on Monday, July 6th, at 11 A.M., and it is important that all delegates be present at this time.

The first general session will open at 11 A.M., on Tuesday, and the Local Committee have hopes that Governor Glynn will be present to make the address of welcome. This will be responded to by Dr. B. Holly Smith, Baltimore, Md. The President's address will be followed by an address by Dr. Victor C. Vaughan, president Amer. Med. Association.

The second general session will be held in Convention Hall, at 8 P.M. Tuesday, and will be a symposium by the Research Commission, with Drs. Weston A. Price, Thomas B. Hartzell, and Russell W. Bunting as speakers. At the Wednesday evening general session Dr. Joseph C. Bloodgood, M.D., of the Johns Hopkins University, will discuss "The Early Recognition of Pre-cancerous Lesions of the Mouth and Tongue." At the Thursday evening general session two selected papers will be presented from Sections I and III.

TENTATIVE PROGRAM.

The program for the section meetings has not been entirely completed, and two or three papers will be added to the following list:

Dr. J. R. Callahan, Cincinnati, Ohio: "Some Phases of Root-canal Treatment."

Dr. W. H. DeFord, Des Moines, Iowa: "Some Phases of Eliminating Pain."

Dr. E. J. Eisen, Wilwaukee, Wis.: "Dental Radiography."

Dr. Herbert L. Wheeler, New York City: Subject to be announced.

Dr. Fred W. Gethro, Chicago, Ill.: Subject to be announced.

Dr. J. D. Patterson, Kansas City, Mo.: "Pyorrhea Alveolaris."

Dr. C. H. Oakman, Detroit, Mich.: "Oral Hygiene."

Dr. Chalmers J. Lyons, Ann Arbor, Mich.: "The Pathological Significance of Impacted Teeth."

Dr. Dayton Dunbar Campbell, Kansas City, Mo.: "Some Basic Principles and Methods in the Reproduction of Mandibular Movements."

Dr. Wm. A. Giffin, Detroit, Mich.: "Technique for Making Impressions and Models for the Construction of Artificial Dentures." (Demonstrated with motion pictures.)

Dr. A. J. Bush, Columbus, Ohio: "Classification of Fixed Bridge Work, with Law Governing Its Application."

Dr. Carl B. Case, Milwaukee, Wis.: "Evolution of Root Movement."

Dr. Jules J. Sarrazin, New Orleans, La.: "Properly Constructed Bridges and their Hygienic Care."

Dr. Homer C. Brown, Columbus, Ohio: "The Responsibilities of the State Society Officers."

Dr. Otto U. King, Huntington, Ind.: "The Business Side of the State Society Work."

The Clinic Committee is to present a Progressive Clinic, Wednesday morning, commencing at 9.30. They have secured a list of exceptionally high-class clinicians for both the progressive and the general clinic. The general clinic will be given Friday morning, and full details of the clinical program will be presented through the National *Bulletin* and later journals.

The Local Committee has selected the Powers Hotel as headquarters, and reservations should be made as early as possible. A full list of hotels and rates will appear in the National *Bulletin*. This committee has made ample provisions for a large meeting.

All reputable practitioners of dentistry and medicine are cordially invited to attend this meeting.

HOMER C. BROWN, *President*,
Columbus, Ohio,
OTTO U. KING, *General Sec'y*,
Huntington, Ind.

FROM THE LOCAL COMMITTEE OF ARRANGEMENTS.

LETTERS from those in charge come to us frequently telling of the success they are having in securing as essayists and clinicians the ablest men from our profession, as well as from the medical profession.

A thing not to be lost sight of in the coming National meeting is the unusual facilities that are offered by Exposition Park. The buildings are either of stone or brick construction, were built especially for convention use, adjoin one another, provide ample space for all requirements, and are scientifically ventilated and mechanically cooled.

Exposition Park has forty-five acres of well-kept, beautifully grassed lawns, with buildings having 100,000 square feet of floor space, and yet is in the heart of the city and not more than ten minutes' ride from headquarters at Powers Hotel and fifteen minutes from all other hotels.

For the accommodation of those who attend the National meeting we are planning to secure a competent chef for the restaurant that is located on the grounds for noonday luncheons.

All of the morning and afternoon sessions will be held at the park, and so arranged that there will be opportunity for each and every one to take advantage of the many good things that will be offered. The evening sessions will be held at Convention Hall.

Any of the following hotels will assure you of courteous and satisfactory treatment: *Powers Hotel. *Seneca Hotel. *Hotel Rochester. *Hayward Hotel. Whitcomb House. New Osborn House. Eggleston Hotel. Hotel Bristol. Clinton Hotel. (The * indicates first-class hotels.) Rates in the first-class hotels are from $1.25 up, European plan; other hotels, $0.75 and up, European plan; $2.00 and up, American plan.

These rates are for two in a room, and we advise early reservations.

EDWARD G. LINK, *Chairman*,
226 Cutler Bldg., Rochester, N. Y.
WILLIAM W. SMITH,
BENEDICT S. HERT,
LOUIS MEISBERGER,
CHAS. L. BRININSTOOL.

FROM THE TRANSPORTATION COMMITTEE.

Railway Passenger Rates To and From ROCHESTER, N. Y.

(July 7–10, 1914.)

Trunk Line Association—covering New York State (east of and including Buffalo, Niagara Falls, and Salamanca) New Jersey, Pennsylvania (east of and including Erie, Oil City, and Pittsburgh) Delaware, Maryland, District of Columbia, Virginia, and West Virginia (east of and including Wheeling, Parkersburg, and Huntington)—have given an open rate of two cents per mile in each direction in their respective territories with the minimum excursion rate of $1. Tickets to be sold and good going July 5th to 7th, and returning to reach original starting-point not later than July 13, 1914.

New England Passenger Association—covering the railways of New England—also grant the above privileges and limitations with tickets from their principal stations. The agent at other stations will require not less than forty-eight hours' notice to procure fares and tickets obtainable from the general passenger department of the railroad.

Eastern Canadian Passenger Association—(Canada east of and including Port Arthur, Sault Ste. Marie, and St. Clair, and Detroit rivers) declined granting reduced fares.

Central Passenger Association—territory west of Buffalo, Pittsburgh, Wheeling, Parkersburg, and Huntington to and including Chicago and St. Louis and north of the Ohio river, including Cincinnati, Louisville and Cairo—have granted a rate of two cents per mile in each direction added to the tender received from trunk lines, through fares however not to be higher than the 30-day summer tourist fares to Buffalo, N. Y., plus tender covered.

Signature form of tickets to be sold on July 4th, 5th, and 6th with return limit to reach starting-point not later than midnight of July 14, 1914, except in border territory common to the trunk lines, selling dates July 5th, 6th, and 7th, with return limit of July 13, 1914. Your committee suggests confer-

ring with local agent for excursion rate with longer limit, if desired.

Southeastern Passenger Association—territory south of Ohio and Potomac and east of Mississippi rivers—declined granting a concession in rates, and suggest that the summer excursion tickets will be on sale daily before the time of meeting, from principal stations in their territory, reaching Buffalo, Niagara Falls, and other points contiguous to Rochester.

Western Passenger Association—territory west of Chicago, Peoria, and St. Louis to and including Denver, Colorado, and Cheyenne, Wyo.—state that the summer tourist fares to eastern sections will be available from principal points in their territory. The general basis of fares, two cents per mile in each direction to their eastern gateways added to the fares over their lines. Confer with local ticket agents.

Southwestern Passenger Association—territory southwest of St. Louis, including Texas, Arkansas, Oklahoma, Missouri (south of Missouri river) and Louisiana (west of Mississippi river) and Mexico—suggest that the summer excursion rates are practically two cents per mile in each direction. Tickets on sale daily May 5th to September 30th, limited to return October 31st. Confer with local agent.

The territory covered by the *Trans-continental Passenger Association*—Pacific coast and other far-western territory not otherwise covered by the above associations—suggest that the summer excursion rate $72.50 is as low as can be granted from San Francisco to Chicago and return. Sale dates for tickets June 29th–30th, and July 2d–3d.

Excursion tickets from Oregon and Washington to Chicago, daily for June and July.

Convenient Trains to Rochester.

Lv. St. Louis, Mo., Big Four route	11.30 A.M.
Lv. Indianapolis, Big Four route	5.50 P.M.
Lv. Cincinnati, Ohio, Big Four route	6.05 P.M.
Lv. Dayton, Ohio, Big Four route	7.45 P.M.
Lv. Springfield, Ohio, Big Four route	8.30 P.M.
Lv. Columbus, Ohio, Big Four route	9.55 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	9.21 A.M.
Lv. Chicago, Ill., Lake Shore & Mich. So. Ry.	5.30 P.M.
Lv. Toledo, Ohio, Lake Shore & Mich. So. Ry.	11.15 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	8.45 A.M.
Lv. Chicago, Ill., Michigan Central R. R.	5.40 P.M.
Lv. Grand Rapids, Mich., Michigan Central R. R.	5.10 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	9.21 A.M.

(Parlor cars and sleepers over these lines reach Rochester via N. Y. Central.)

Through tickets to New York permit stopover of ten days at Rochester by depositing ticket at station ticket office immediately upon arrival—a convenience to those joining the European tour or visiting the metropolis.

From New York to Rochester.

(Excursion tickets sold July 5th–7th, return by July 13th.)

Lv. New York, N. Y., New York Central R. R.	8.30 A.M.	9.34 P.M.	11.35 P.M.
Ar. Rochester, N. Y., New York Central R. R.	4.05 P.M.	6.30 A.M.	8.13 A.M.
Rate to Rochester—excursion both directions			$14.45
Lv. New York, N. Y., West Shore R. R.		8.35 A.M.	7.20 P.M.
Ar. Rochester, N. Y., West Shore R. R.		6.40 P.M.	5.12 A.M.
Rate to Rochester—excursion both directions			$13.40
Lv. New York, N. Y., Lehigh Valley R. R.	9.50 A.M.	11.50 A.M.	8.50 P.M.
Ar. Rochester, N. Y., Lehigh Valley R. R.		9.44 P.M.	8.25 A.M.
Rate to Rochester—excursion both directions			$13.40
For ten or more people, traveling on one ticket			13.20

Black Diamond Express (11.50 A.M.) fare $13.40—Pullman seat $1.75.

☞ *Confer with local railway agents with reference to excursion rates to Rochester or nearby points, with stopover privileges.*

V. H. JACKSON, *Chairman*, New York, N. Y. H. F. HOFFMAN, Denver, Colo.
L. P. DOTTERER, Charleston, S. C. T. S. SMITH, Palo Alto, Cal.
WM. W. BELCHER, *Sec'y*, Rochester, N. Y.

At Rochester.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE thirty-second annual session of the National Association of Dental Examiners will be held at the Rochester Hotel, Rochester, N. Y., beginning July 6, 1914, at 10 A.M., and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards invited.

Hotel reservations should be made immediately, as the National Dental Association meets in Rochester during the week beginning July 6th, and the attendance undoubtedly will be large.

A. E. HONEY, *President*,
Kalamazoo, Mich.,
T. A. BROADBENT, *Sec'y*,
15 E. Washington st., Chicago, Ill.

At Rochester.

DELTA SIGMA DELTA.

THE thirtieth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the Powers Hotel, Rochester, N. Y., Monday, July 6, 1914, at 10 A.M. Business of importance and initiation has been arranged for the day, followed by the annual banquet in the evening.

By order of the Supreme Chapter.

WILLIAM D. TRACY, *Supreme Grand Master*.
R. HAMILL D. SWING, *Supreme Scribe*.

At Rochester.

XI PSI PHI FRATERNITY NATIONAL ALUMNI.

"GOOD-FELLOWSHIP, NOT POLITICS."

THE next annual meeting of the Xi Psi Phi Fraternity National Alumni Association will be held in Rochester, N. Y., Monday, July 6, 1914. The afternoon entertainment will be under the direction of the Local Committee of Arrangements. The banquet will be held at 6.30 P.M., followed by the business meeting.

The Hotel Seneca has been secured as headquarters.

Send acceptance to Dr. Geo. C. Lowe, C. of C. Bldg., Rochester, N. Y., so as to secure reservations.

L. M. WAUGH, *Pres.* C. O. SIMPSON, *Sec'y*.

AMERICAN DENTAL SOCIETY OF EUROPE.

ANNUAL MEETING—PARIS, JULY 30TH.

THE forty-first annual meeting of the American Dental Society of Europe will be held in Paris, France, July 30, 31, and August 1, 1914, at the Hotel Continental. All members of the profession are cordially invited to be present.

G. B. HAYES, *Sec'y*.

NATIONAL DENTAL ASSOCIATION—SOUTHERN BRANCH.

THE Southern Branch of the National Dental Association will hold its next regular meeting at Atlanta, Ga., June 4 to 6, 1914, inclusive. The Local Committee of Arrangements have selected the Hotel Ansley as headquarters, and have the other necessary arrangements made for this meeting.

The new officers—W. A. Dean of Tampa, Fla., president; Jos. D. Eby of Atlanta, Ga., recording secretary, and Jesse L. Williams of Jacksonville, Fla., corresponding secretary—hope to make the 1914 meeting an unusual success.

W. A. DEAN, *Pres.*,
Tampa, Fla.,
JESSE L. WILLIAMS, *Sec'y*,
Jacksonville, Fla.

AMERICAN MILLER MEMORIAL.

TO THE DENTAL PROFESSION OF AMERICA:

The committee appointed by the Ohio State Dental Society at the 1909 meeting for the purpose of raising funds for an American Memorial to the late Dr. W. D. Miller desire to make the following report:

Funds have been received from the following states: Alabama $25.00, Arizona $25.00, Arkansas $50.00, California $60.00, Colorado $82.00, Connecticut $50.00, Georgia $60.00, Illinois $531.00, Iowa $200.00, Indiana $75.00, Kansas $134.50, Kentucky $105.00, Maine $25.00, Massachusetts $100.00, Michigan $300.00, Minnesota $100.00, Missouri $100.00, Montana $15.00, Nebraska $100.00, New Hampshire $25.00, New Mexico $25.00, New York $125.00, Ohio $1303.00, South Carolina $25.00, North Dakota $50.00, South Dakota $15.00, Oklahoma $31.00, Oregon

$50.00, Pennsylvania $20.00, Tennessee $50.00, West Virginia $25.00, Washington $50.00, Wisconsin $25.00, Wyoming $10.00, Texas $50.00, Utah $14.00, Vermont $20.00, Virginia $50.00. Total $4300.50; interest on this fund to December 1, 1913, amounts to $382.94, making a total in the hands of the treasurer, Dr. Weston A. Price, of $4683.44. Florida and Mississippi have each voted $50.00, but the amounts are not in the treasurer's hands at this date.

The Memorial will consist of an 8-foot bronze statue of Dr. Miller mounted on a 7-foot granite pedestal, to be placed on the lawn of the public library, the most appropriate site in the city of Columbus, the capital of Dr. Miller's native state. Suitable tablets will be prepared, and it is the desire of the committee to state on one that the monument is erected by funds from every state in the Union. If your state is not represented in the above list, we want your co-operation in placing it there.

It is hoped that sufficient funds—$5500.00—will be in the treasury that steps can be taken at once toward the construction of this memorial, so that it may be finished and ready for unveiling at the 1915 meeting, which will be the fiftieth anniversary, of the Ohio State Society. The valuable co-operation of the honorary committees in the several states is hereby acknowledged; they have made this memorial a reality.

Other professions have done honor to their distinguished dead; let us do the same for Dr. Miller, whose life was one of unselfish devotion to the scientific advancement of dentistry.

Yours very truly,

EDWARD C. MILLS, *Chairman*,
J. R. CALLAHAN,
S. D. RUGGLES,
Committee.

COLUMBUS, OHIO, April 7, 1914.

AMERICAN SOCIETY OF ORTHODONTISTS.

THE annual meeting of the American Society of Orthodontists will convene in Toronto, Can., July 2, 3, and 4, 1914.

WM. ERNEST WALKER, *Sec'y*,
629-31 Maison Blanche, New Orleans, La.

AMERICAN MEDICAL ASSOCIATION—

Section of Stomatology.

THE annual meeting of the American Medical Association will be held at Atlantic City, N. J., June 22 to 26, 1914. Following is the program for the Section of Stomatology:

TUESDAY, 2 P.M.

(1) Chairman's Address. Dr. William C. Fisher, New York, N. Y.

(2) "Mesothelial Tumors of the Jaw." Dr. Robert H. Ivy, Philadelphia, Pa.

Discussion—Dr. Robert P. Bay, Baltimore, Md.

(3) "Cystic Tumors of the Jaw." Dr. Gordon New, Rochester, Minn.

(4) "Differential Diagnosis of Major Mouth Lesions." Dr. Stewart L. McCurdy, Pittsburgh, Pa.

(5) "The Methods of Obtaining Dental Service in Hospitals by the Appointment of Internes." Dr. Herbert L. Wheeler, New York, N. Y.

WEDNESDAY, 2 P.M.

(6) "What Shall be the Content for a Course in Oral Surgery in Our Dental Schools." Dr. A. H. Levings, Milwaukee, Wis.

Discussion—Dr. Geo. V. I. Brown, Milwaukee, Wis.; Dr. Thomas Gilmer and Dr. F. B. Moorehead, Chicago, Ill.; Dr. M. I. Schamberg, New York, N. Y.; Dr. J. A. Pettit, Portland, Ore.; Dr. Vilray P. Blair, St. Louis; Dr. M. H. Cryer, Philadelphia, Pa., and Dr. Jas. G. Sharp, San Francisco.

THURSDAY, 9.30 A.M.

(7) "The Scientific Routine of Toothbrushing and Mouth-cleaning." Dr. Joseph Head, Philadelphia.

(8) "Osteoplastic Surgery of the Face." Dr. Wayne W. Babcock, Philadelphia.

(9) "Fractures of the Inferior Maxilla." Dr. Henry S. Dunning, New York City.

(10) "Bacteriology of Alveolar Abscess." Dr. Thomas Gilmer, Chicago.

(11) "Acute Parenchymatous Glossitis." Dr. Virgil Loeb, St. Louis.

(12) "The Section of Stomatology as a Factor in the Evolution of Dental and Medical Science." Dr. Geo. V. I. Brown, Milwaukee.

THURSDAY, 2 P.M.

(13) "Mouth Infection as a Source of Systemic Disease." Dr. Frank Billings, Chicago.

Discussion—Dr. Edward C. Rosenow, Chicago; Dr. Charles H. Mayo, Rochester; Dr. Victor C. Vaughan, Ann Arbor, Mich.; Dr. Charles L. Mix, Chicago; Dr. Daniel H. Squire, Buffalo ("The Peridental Membrane as a Source of Infection"), and Dr. C. B. Craig, New York ("Mouth Infection in Relation to Nervous Affection").

We are exceptionally fortunate in having on the program of this meeting the gentleman whose original research work has correlated certain systematic diseases with mouth infections.

An effort will be made to harmonize the different methods of teaching oral surgery in our dental schools, and to formulate a comprehensive scheme for a uniform course of instruction.

A very attractive program is here offered, and those who are interested are cordially invited to be present and take part in the discussions.

EUGENE S. TALBOT, *Sec'y.*

International Exhibition, Lyons, 1914.

ORAL AND DENTAL HYGIENE CONGRESS.

LYONS, FRANCE, SEPTEMBER 24–28, 1914.

Dear Colleague,—Inasmuch as hygiene in general is rapidly growing in public recognition of its importance, and as oral hygiene in particular is developing daily with the advance of knowledge in our branch of the art of healing, it has been deemed most desirable that a Congress of Oral and Dental Hygiene shall form a constituent part of the general Hygiene Congress which is to be held in Lyons during the International Exhibition to take place there in September next.

Preparations for this congress are being made under most favorable auspices. The most distinguished scientists are giving it their patronage, and its synchronizing with the great Exhibition organized by the city of Lyons greatly enhances the assurance of success both for the meeting in general and for the special section devoted to the consideration of the oral and dental phases of hygiene.

We desire to appeal to all workers in the field of diseases of the mouth and teeth, believing that—laying aside subjects of professional disputation—we can heartily meet and harmoniously exchange ideas on the subject of oral hygiene, with most profitable results to ourselves and our patients.

The congress will include active members and associate members (members' relatives). Dues have been fixed at 15 fr. for active members and 5 fr. for associates.

Membership will entitle to many privileges. The Transactions, with papers and discussions, will be published after the congress, and will be forwarded to members free of charge. The Committee of Organization is preparing official receptions and festivities and arranging for excursions. A Ladies' Committee will cordially receive our *confrères*' wives and will endeavor to make their stay in Lyons as pleasant as possible.

It is unnecessary to enlarge upon the opportunity presented by this occasion from the professional standpoint. The undersigned, in the name of the Committee of Organization, solicit your enrollment as an active member, and request that you forward your application at your earliest possible convenience, also the title of any paper which you may have to present to the congress, to the general secretary, Dr. J. Vichot, 6 rue de la Barre, Lyons.

With fraternal greetings,

Sincerely yours,

A. PONT, *President,*
J. VICHOT, *Gen. Sec'y.*

FORSYTH DENTAL INFIRMARY FOR CHILDREN.

Boston, Mass.

POSITIONS ON PERMANENT STAFF.
(Salary $1000 per Year.)

Examination of graduates in dentistry (of less than three years' standing) for appointments to positions on the permanent staff of this institution will be held at Boston, Mass., June 8, 1914.

The Forsyth Dental Infirmary for Children is an institution founded by John Hamilton and Thomas Alexander Forsyth in memory of their brothers James Bennett and George Henry Forsyth. This institution, which will have 64 dental chairs, is expected to open in the fall of 1914. It is intended to care for the dental needs of 220,000 school children in Boston and its suburbs. The clinical department, splendidly equipped and presenting unequaled facilities for post-graduate study in dental prophylaxis, orthodontia, and oral surgery, offers to a limited number of recent dental graduates the opportunity to serve as members of its permanent staff at a salary of

$1000 per year. Appointments will be made for one or two years.

Successful candidates for positions on this staff will be required to pass the examination of the Massachusetts State Board of Registration in Dentistry.

APPOINTMENTS FOR HALF-TIME SERVICE.
(Salary $300 per Year.)

The appointments for this service are open to men and women graduates in dentistry, and offer unusual opportunities for clinical work in dental prophylaxis, orthodontia, and oral surgery, in the best-equipped and most modern institution of its kind in the world. Appointments will be made for one year, as follows:

Half-time service, requiring twenty-four hours per week, salary $300; one-third time service, requiring sixteen hours per week, salary $100; and will be made subject to satisfying the requirements of the Massachusetts State Board of Registration in Dentistry.

A diploma of service will be issued to those who have completed their term to the satisfaction of the Trustees.

Members of this staff will be entitled to the advantages of reports and clinics by experts in the various branches of dentistry, from different parts of the world.

All material and necessary operating instruments will be furnished; up-to-date apparatus, including electric engines, sterile instrument trays, fountain cuspidors, compressed air and modern operating-room-type lavatories will be available for use.

Applications for the above positions should be made not later than June 4, 1914, to the Director, Harold DeW. Cross, D.M.D., No. 149 Tremont street, Boston, Mass., who will gladly furnish information to those interested.

LOUISIANA STATE DENTAL SOCIETY.

THE thirty-sixth annual meeting of the Louisiana State Dental Society will be held in Baton Rouge, La., June 4, 5, and 6, 1914.

E. B. DUCASSE, *Sec'y.*

NEW HAMPSHIRE DENTAL SOCIETY.

THE annual meeting of the New Hampshire Dental Society will be held at the New Hotel Weirs, Weirs, N. H., June 17, 18, and 19, 1914.

E. H. ALBEE, *President,*
LOUIS I. MOULTON, *Sec'y,*
Concord, N. H.

MONTANA STATE DENTAL SOCIETY.

CHANGE OF DATE OF MEETING.

THE Montana State Dental Society will meet in Great Falls, Mont., June 8, 9, and 10, 1914.

F. W. ADAMS, *Sec'y,*
Billings, Mont.

NORTHERN OHIO DENTAL ASSOCIATION.

THE fifty-seventh annual session of the Northern Ohio Dental Association will be held at the Wigmore Coliseum, Cleveland, Ohio, Thursday, Friday, and Saturday, June 4, 5, and 6, 1914.

C. D. PECK, *Sec'y,*
Sandusky, Ohio.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE forty-fourth annual meeting of the South Carolina State Dental Association will be held at the Chick Springs Hotel, Chick Springs, S. C., on June 17, 18, and 19, 1914.

All ethical practitioners invited to attend.

The clinic will be in charge of Dr. I. M. Hair, Greenville, S. C., who will furnish any information relative to same. Exhibitors desiring space will please address Dr. J. P. Carlisle, Greenville, S. C.

Any other information will be cheerfully furnished by

W. BUSEY SIMMONS, *Sec'y,*
Piedmont, S. C.

GEORGIA STATE DENTAL SOCIETY.

THE forty-seventh annual meeting of the Georgia State Dental Society will convene at the Ansley Hotel, Atlanta, Ga., June 4, 5, and 6, 1914, beginning Thursday, June 4th, at 10 A.M.

The Georgia Society meets with the Southern Branch of the National Dental Association. Most excellent papers will be read, and clinics given well worth observation.

All ethical practitioners throughout the country are extended a cordial invitation. Any further information cheerfully furnished.

M. M. FORBES, *Sec'y.*
803-04 Candler Bldg., Atlanta, Ga.

Sixth International Dental Congress.

London, August 3 to 8, 1914.

Patron: His Majesty the King.

The Sixth International Dental Congress will be held in London from August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and to the self-governing Dominions of the Empire to send official representatives to the congress.

The Committee of Organization (appointed under Art. XVI of the International Dental Federation) has completed the list of the various Sections, Officers, and Subjects for Report and Debate. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

The International Dental Congress Museum is intended to be representative of every section of the congress.

A Demonstrations Committee is being organized, with Mr. T. A. Coysh as chairman and Mr. W. F. Mellersh as hon. secretary.

Independent papers and demonstrations: These must be notified to the secretary of the appropriate section, the council of each section having the right to make selection and to decline any that may not be desired. Notifications received after the specified time can be considered only after the program has been arranged subject to selection by the president of the section. Fifteen minutes will be allowed for the reading of a paper.

Papers may be written in English, French, or German, and must be delivered to the secretary of the section concerned, preferably typewritten and ready for printing. An abstract or summary to reach the secretary of the section *before June 1st.* Notices of demonstrations, including a list of the demonstrator's requirements, by same date.

Copyright of communications to the congress becomes the property of the Committee of Organization.

The Rules make eligible for membership all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of that in which they practice.

At the closing meeting (Saturday, August 8th) the President will submit the amended constitution of the International Dental Federation to the vote, and will announce the place and date of the next congress.

The subscription for members will be 30s. (38 francs; 31 marks; $7.50); for members of their families accompanying them, 15s. (19 francs; 15½ marks; $3.75).

Subscriptions (by postal order, draft or check) payable to the treasurer Sixth International Dental Congress, who will send a formal receipt. (With application, inclose card, with dental or medical qualifications and titles, and full postal address—any change in which must be immediately notified.)

Members will receive the official program, the daily journal of the congress, the catalogs of the exhibitions, and the Transactions.

Correspondence should be addressed to the Officers of the Congress, as follows:

Hon. General Secretaries,
Sixth Internat'l Dental Congress,
19 Hanover Square, London, W.

Arrangements of the American National Committee.

(Appointed by the National Dental Association.)

The committee having in charge the affairs of the congress relating to the United States having selected the following to make addresses at the congress:

Addresses.

Dr. H. J. Burkhart, Batavia, N. Y. Address on behalf of the National Dental Association at the opening session.

Dr. Edward C. Kirk, Philadelphia, Pa. Address before the general session, on the

afternoon session of the opening day. Subject, "The Tendencies in Dental Education."

Honorary Presidents of Sections.

I. *Dental Anatomy, Histology, and Physiology.* Dr. M. H. Cryer, Philadelphia, Pa.

II. *Dental Pathology and Bacteriology.* Dr. Thos. B. Hartzell, Minneapolis, Minn.

III. *Dental Surgery and Therapeutics.* Dr. Edward S. Gaylord, New Haven, Conn.

IV. *Dental Physics, Radiography, and Metallurgy.* Dr. J. P. Buckley, Chicago, Ill.

V. *Dental Prosthesis.* Dr. D. O. M. LeCron, London, England.

VI. *Orthodontics.* Dr. Roscoe A. Day, San Francisco, Cal.

VII. *Oral Surgery and Surgical Prosthesis.* Dr. J. D. Patterson, Kansas City, Mo.

VIII. *Anesthesia, General and Local.* Dr. Thos. P. Hinman, Atlanta, Ga.

IX. *Oral Hygiene, Public Instruction and Public Dental Services.* Dr. Herbert L. Wheeler, New York, N. Y.

X. *Dental Education.* Dr. Henry W. Morgan, Nashville, Tenn.

[See list of Reporters and Subjects for Report and Debate in the May issue of the Cosmos.]

The committee invite the ethical members of the profession of the United States to become members of the congress. Membership, which includes admission to the congress sessions and a copy of the proceedings, is $7.50, and for members of their families accompanying them $3.75.

Dr. Herbert L. Wheeler, 560 Fifth ave., New York City, has been appointed by the committee to arrange for steamship rates, sailing dates, itinerary, etc. Those desiring to attend the congress, sailing with the American delegation—immediately following the meeting of the National Dental Association, Rochester, N. Y., which closes July 10, 1914—are requested to correspond with Dr. Wheeler.

Truman W. Brothy, *Chairman*,
Wm. Carr,
S. H. Guilford,
Waldo E. Boardman,
Committee.

Burton Lee Thorpe, *Sec'y*,
3605 Lindell Boulevard, St. Louis, Mo.

PENNSYLVANIA STATE DENTAL SOCIETY.

The forty-sixth annual meeting of the Pennsylvania State Dental Society will be held at the Bellevue-Stratford Hotel, Philadelphia, on June 30, July 1 and 2, 1914.

Luther M. Weaver, *Sec'y*,
7103 Woodland ave., Phila.

NORTH CAROLINA DENTAL SOCIETY.

The North Carolina Dental Society will hold its next annual meeting in Hendersonville, N. C., June 24 to 27, 1914.

J. Martin Fleming, *Sec'y*,
Raleigh, N. C.

MISSISSIPPI DENTAL ASSOCIATION.

The thirty-ninth annual meeting of the Mississippi Dental Association will be held in Vicksburg, June 23, 24, and 25, 1914.

M. B. Varnado, *Sec'y*,
Osyka, Miss.

TENNESSEE STATE DENTAL ASSOCIATION.

The forty-seventh annual meeting of the Tennessee State Dental Association will be held June 25 to 27, 1914, at Chattanooga, Tenn.

C. O. Rhea, *Sec'y*,
Nashville, Tenn.

COLORADO STATE DENTAL ASSOCIATION.

The twenty-eighth annual meeting of the Colorado State Dental Association will convene at Manitou, Colo., June 25, 26, and 27, 1914. A cordial invitation is extended to all ethical practitioners to attend our meeting.

Clinicians and exhibitors desiring accommodations will please address Dr. E. I. Backus, 719 Exchange National Bank Building, Colorado Springs, Colo. Any other information will be cheerfully furnished by the secretary.

Geo. Y. Wilson, *President*,
Colorado Springs, Colo.
Earl W. Spencer, *Sec'y*,
Pueblo, Colo.

MAINE DENTAL SOCIETY.

THE forty-ninth annual meeting of the Maine Dental Society will be held at the New Augusta House, Augusta, Me., June 25, 26, and 27, 1914.

I. E. PENDLETON, *Sec'y*,
Lewiston, Me.

VIRGINIA STATE DENTAL ASSOCIATION.

THE next meeting of the Virginia State Dental Association will be held at Old Point Comfort, Va., July 1, 2, and 3, 1914, inclusive. All ethical dentists are invited to attend.

C. B. GIFFORD, *Sec'y*,
Norfolk, Va.

FLORIDA STATE DENTAL SOCIETY.

THE Florida State Dental Society will hold its annual meeting at Atlantic Beach Hotel, Atlantic Beach, Fla., July 1, 2, and 3, 1914. All ethical dentists cordially invited to attend. Any other information will be gladly furnished by

ALICE P. BUTLER, *Corresponding Sec'y*,
Gainesville, Fla.

CALIFORNIA STATE DENTAL ASSOCIATION.

THE annual meeting of the California State Dental Association will be held at Camp Curry, in the Yosemite Valley, in joint meeting with the Southern California Dental Association, on June 29 and 30, July 1 and 2, 1914. The Southern Pacific R. R. Co. will furnish a special train, which will leave San Francisco Sunday morning, June 28th, at 7.40 o'clock, arriving at Camp Curry at 5 P.M. the same day, thereby assuring a daylight trip and an opportunity of viewing the beautiful scenery *en route*. This train will be composed of standard steel chair cars, baggage cars, necessary number of diners, and buffet observation car. For further and detailed information as well as for transportation and accommodations at Camp Curry, application should be made to

E. EVANS, *Sec'y*,
Union Savings Bank Bldg., Oakland, Cal.

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirty-first annual meeting of the Minnesota State Dental Association will occur in Duluth, Minn., August 6, 7, and 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

BENJAMIN SANDY, *Sec'y*,
Minneapolis, Minn.

TRI-STATE DENTAL ASSOCIATION.

THE first annual meeting of the Tri-State Dental Association [District of Columbia, Maryland, and Virginia] will be held at the Bay Shore Hotel, Buckroe Beach, Va., July 23, 24, and 25, 1914. A program of unusual interest has been prepared, and we extend a cordial invitation to all ethical practitioners of other states.

D. H. FERGUSON, *President*,
J. M. G. RAMSEY, *Sec'y*.

NEW JERSEY STATE DENTAL SOCIETY.

THE twin cities by the sea—Ocean Grove and Asbury Park—will again entertain the members and guests of the New Jersey State Dental Society. The forty-fourth annual convention of the society will be held in the North End Hotel, Ocean Grove, N. J., on July 15, 16, 17, and 18, 1914, beginning at 10 A.M. on Wednesday, July 15th.

The North End Hotel is one of the largest and finest on the Jersey coast, and is situated directly on the beach front at the foot of Wesley lake and within a moment's walk of the Asbury Park Casino and trolley. Connected with the hotel by a bridge over the boardwalk is a large pavilion built over the ocean. The second floor of this pavilion will be devoted exclusively to exhibits and clinics.

Dr. Walter F. Barry, 220 Essex ave., Orange, N. J., is chairman of the Exhibit Committee, and has made an ideal arrangement of space for the exhibits. Dr. Barry will be glad to furnish information regarding the rates and space still available.

The clinics will be in charge of Dr. James I. Woolverton, 228 W. State st., Trenton, N. J. Plenty of space will be available, so

that crowding will be avoided and everyone will have a chance to see the clinics.

The meetings of the society and the reading of papers will take place in the hotel either in the American dining room or in the picture theater, as will be announced in the program, which will be issued about July 1st.

At the hotel end of the bridge a room will be reserved for the officers of the society as headquarters, and this will be the executive office and bureau of information during the convention.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH, *Sec'y*,
430 E. State st., Trenton, N. J.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS.

THE next examination of applicants for license to practice dentistry will be held June 1, 2, 3, and 4, 1914. Applications should be in the hands of the secretary two weeks before the date of the examination. Fee ten dollars.

For further information address

STARR PARSONS, *Sec'y*,
1309 L st., N. W. Washington, D. C.

ARKANSAS BOARD OF EXAMINERS.

THE next meeting of the Arkansas State Board of Dental Examiners will be held at the Marion Hotel, Little Rock, Ark., on June 8 and 9, 1914.

Application and fees should be filed at least ten days prior to date set for examination.

For further particulars address

I. M. STERNBERG, *Sec'y*,
Merch. Nat'l Bank Bldg., Fort Smith, Ark.

ALABAMA BOARD OF EXAMINERS.

THE Board of Dental Examiners of Alabama will meet at Selma, Ala., on the morning of June 2, 1914.

Examinations will be both theoretical and practical; all theoretical examinations must be in writing.

Applicants must furnish instruments and material for any work required by the board; must be twenty-one years of age, of good moral character, and must present to the board diploma or satisfactory evidence that he or she has graduated in dentistry at some college of dentistry recognized by the National Association of Dental Faculties.

W. J. REYNOLDS, *Sec'y*,
Parrish Building, Selma, Ala.

IOWA BOARD OF EXAMINERS.

THE next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, commencing at 9 A.M., June 1, 1914. For application blanks and particulars write

J. A. WEST, *Sec'y*,
417 Utica Bldg., Des Moines, Iowa.

MASSACHUSETTS BOARD OF REGISTRATION.

A MEETING of the Massachusetts Board of Registration in Dentistry will be held in Boston, Mass., June 3, 4, and 5, 1914. For applications and other information apply to

G. E. MITCHELL, *Sec'y*,
14 Water st., Haverhill, Mass.

PENNSYLVANIA BOARD OF EXAMINERS.

THE next examination of the Pennsylvania Board of Dental Examiners will be held in Musical Fund Hall, Philadelphia, and the College of Pharmacy Building, Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, June 10, 11, 12, and 13, 1914. Application blanks can be secured from the Department of Public Instruction, Harrisburg.

For further information, address

ALEXANDER H. REYNOLDS, *Sec'y*,
4630 Chester ave., Philadelphia, Pa.

OKLAHOMA BOARD OF EXAMINERS.

THE next regular meeting of the Oklahoma Board of Dental Examiners will be at Oklahoma City, beginning Thursday, June 11th. All applications must be filed with the secretary ten days prior to date set for examination, and must be accompanied by a diploma from some reputable dental college.

For full particulars and application blanks address

E. E. HEFLIN, *Sec'y*.
Oklahoma City, Okla.

MICHIGAN BOARD OF EXAMINERS.

THE next meeting of the Michigan State Board of Dental Examiners will be held at the Dental College, Ann Arbor, commencing Monday, June 15, 1914, and continuing through the 20th. For application blank and full particulars address

F. E. SHARP, *Sec'y*,
Port Huron, Mich.

NORTH CAROLINA BOARD OF EXAMINERS.

THE next regular meeting of the North Carolina State Board of Dental Examiners will be held at Hendersonville, N. C., beginning promptly at 9 A.M. on Monday, June 22, 1914. All applications must be in the hands of the secretary not later than June 15th.

For further information and application blanks address

F. L. HUNT, *Sec'y*,
Asheville, N. C.

SOUTH CAROLINA BOARD OF EXAMINERS.

THE next annual meeting of the South Carolina State Board of Dental Examiners will be held at Chick Springs, S. C., beginning Friday, June 12, 1914, at 10 A.M.

Examinations are theoretical and practical on regular college branches. Applicants must furnish instruments and material for any demonstrations called for by the board, and must exhibit diploma from a reputable dental college before being registered for examination.

For further information, address

R. L. SPENCER, *Sec'y*,
Bennettsville, S. C.

CALIFORNIA BOARD OF EXAMINERS.

THE next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in the city of San Francisco, beginning on June 5, 1914, at 10 A.M. This examination will be followed by one in Los Angeles, beginning on June 17th, at 10 A.M.

Applicants for the examination in San Francisco will file their applications with the board on the morning of June 5th, and for the examination in Los Angeles on the morning of June 17th. Each application must be accompanied by the fee of twenty-five dollars and the necessary credentials—diploma or licenses from other states—together with a recent unmounted photograph of the applicant. For further particulars address

C. A. HERRICK, *Sec'y*,
133 Geary st., San Francisco, Cal.

OHIO DENTAL BOARD.

THE Ohio State Dental Board will meet in Columbus, Ohio, on June 16, 1914, to examine applicants to practice in the State of Ohio. Applications must be in the hands of the secretary June 5th.

HOLSTON BARTILSON, *Sec'y*,
150 E. Broad st., Columbus, Ohio.

TENNESSEE BOARD OF EXAMINERS.

THE Tennessee Board of Dental Examiners will meet in Nashville, June 15 to 19, 1914. Applicants must present diplomas from reputable dental colleges. The examinations will be written and clinical. Operations in operative and mechanical dentistry will be required. A fee of fifteen dollars is charged, and must accompany every application, which must be in writing.

The board will refuse license to anyone making false statements or cheating.

B. D. BRABSON, *President*,
R. M. GERMAN, *Sec'y*.

ILLINOIS BOARD OF EXAMINERS.

THE semi-annual meeting of the Illinois State Board of Dental Examiners for the examination of applicants for a license to practice dentistry in the State of Illinois will be held at the Northwestern Dental School, 31 West Lake st., Chicago, Ill., beginning Thursday, June 11, 1914, at 9 A.M. All applications, together with fee, twenty-six dollars, must be filed with the secretary at least five days prior to date of examination.

Address all communications to

O. H. SEIFERT, *Sec'y*,
305-6-7-8 Ridgely Bank Bldg.,
Springfield, Ill.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners, for examination of applicants for certificates to practice dentistry in the State of Texas, will be held in Dallas, Texas, June 22, 1914, at the High-school building, beginning at 9.00 A.M.

No diplomas recognized; no interchange of licenses with other states. All applications, accompanied by the fee of $25, should be in the hands of the secretary not later than June 17th.

For further information, address

C. M. McCauley, *Sec'y*,
Abilene, Texas.

VERMONT BOARD OF EXAMINERS.

The next meeting of the Vermont Board of Dental Examiners, for the examination of candidates to practice in Vermont, will be held at the State-house, Montpelier, commencing at 2 P.M. on June 29, 1914, and continuing for three days.

To be eligible for examination a candidate must (1) be twenty-one years of age, (2) must be a graduate of a high school of the first class, and (3) must be a graduate of a reputable dental college.

Applications must be in the hands of the secretary not later than June 20th. For further information apply to

George F. Cheney, *Sec'y*,
St. Johnsbury, Vt.

FLORIDA BOARD OF EXAMINERS.

The Florida State Board of Dental Examiners will meet June 26, 27, 29, and 30, 1914, in Jacksonville.

All applicants must come prepared to put in one gold and one amalgam filling in the mouth, make one post crown, and set up upper and lower set of teeth on an anatomical articulator. Articulators, models, blowpipes, and gas appliances furnished by the board. Applicants must exhibit diplomas from reputable dental schools. The secretary would like to meet all applicants at the Seminole Hotel at eight o'clock on the evening of June 25th. Fee $25.00.

W. G. Mason, *Sec'y*,
Tampa, Fla.

INDIANA BOARD OF EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State-house, at Indianapolis, Ind., beginning June 15th, and continuing five days. For further information and blanks address

F. R. Henshaw, *Sec'y*,
507 Pythian Bldg., Indianapolis, Ind.

MISSISSIPPI BOARD OF EXAMINERS.

The Mississippi State Board of Dental Examiners will hold its annual examination June 16, 17, and 18, 1914, at the State Capitol in Jackson.

Applicants will be required to present their diplomas from a reputable dental college or school of dental surgery before entering upon examination; in addition thereto will be required to make not less than 75 per cent. on each subject and all practical work.

Reuel May, *Sec'y*,
Jackson, Miss.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee at Marquette University, on June 22, 1914, at 2 P.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee must be filed with the secretary fifteen days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations.

Special application blanks for this examination and $10 fee, together with high-school credits, to be filed fifteen days in advance.

F. A. Tate, *President*,
W. T. Hardy, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

MAINE BOARD OF EXAMINERS.

A MEETING of the Maine Board of Dental Examiners will be held at the State-house, Augusta, June 23 and 24, 1914. For further information and application apply to

I. E. PENDLETON, *Sec'y*,
Lewistown, Me.

DENTAL COMMISSIONERS OF CONNECTICUT.

THE Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Thursday, Friday, and Saturday, June 18, 19, and 20, 1914, to examine applicants for license to practice dentistry. Application blanks, rules, etc., will be forwarded by the Recorder upon request.

By order of the Commission.

EDWARD EBERLE, *Recorder*,
902 Main st., Hartford, Conn.

NEVADA BOARD OF EXAMINERS.

THE Nevada State Board of Dental Examiners will meet at Carson City, Nev., June 27, 1914, to examine applicants who present themselves to take the examination.

DAVID W. RULISON, *President*.
WM. H. CAVELL, *Sec'y*.

NEW JERSEY BOARD OF EXAMINERS.

THE New Jersey State Board of Dental Examiners will hold their regular annual meeting and examination in the Assembly Chamber of the State-house, Trenton, N. J., on June 29, 30, and July 1, 1914. License fee, $25. No interchange of license. Applications must be filed *complete* with the secretary at least ten days before date set for examination.

All applicants for a license to practice dentistry in New Jersey—"shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college, he or she had obtained an academic education consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof." Therefore the secretary will issue application blanks to applicants only upon the presentation of the required certificate from the superintendent of public instruction, Trenton, N. J.

A bridge, consisting of three or more teeth, exclusive of abutments, and one Richmond crown (gold metal) will be required, mounted and articulated, as a practical test in prosthetic dentistry, in place of a full set of teeth soldered upon a gold or coin silver plate as hitherto required.

For further particulars, apply to

ALPHONSO IRWIN, D.D.S., *Sec'y*,
425 Cooper st., Camden, N. J.

NORTH DAKOTA BOARD OF EXAMINERS.

THE next regular meeting of the North Dakota Board of Dental Examiners will be held in Fargo, N. D., July 13, 14, 15 and 16, 1914. All applications for examinations must be in the hands of the secretary by July 3, 1914.

For further information apply to

F. A. BRICKER, *Sec'y*,
Fargo, N. D.

SOUTH DAKOTA BOARD OF EXAMINERS.

THE next regular semi-annual meeting of the South Dakota Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, July 7, 1914, at 1.30 P.M. Applications for examination must be made before July 1st. For blanks and further particulars apply to

ARIS L. REVELL, *Sec'y*,
Lead, S. D.

BOARD OF EXAMINERS FOR THE PHILIPPINE ISLANDS.

THE next regular meeting of the Board of Dental Examiners for the Philippine Islands to examine applicants for license to practice dentistry in the Philippines will be held in Manila, July 7, 1914. Only those who have diplomas from reputable and legally incorporated dental colleges are eligible to examination.

Any further information can be obtained by addressing

LOUIS OTTOFY, *Sec'y*,
Manila, P. I.

IDAHO BOARD OF EXAMINERS.

THE next regular semi-annual meeting of the Idaho Board of Dental Examiners will be held at Boise, Idaho, on Wednesday, July 1, 1914, at 9 A.M., in the State Capitol building. Applications for examination must be made before July 1st. For blanks and further particulars apply to

A. A. JESSUP, *Sec'y*,
Boise, Idaho.

ARIZONA BOARD OF EXAMINERS.

THE Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. HARVEY BLAIN, *Sec'y*,
Prescott, Ariz.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board of Dental Examiners will hold their annual meeting in Helena, Mont., July 13 to 17, 1914, inclusive. All applications must be in the hands of the secretary ten days prior to the opening of the meeting. Examination and license fee $50. For other information and examination blanks address

RALPH R. RATHBONE, *President*,
Dillon, Mont.
GILBERT A. CHEVIGNY, *Sec'y*,
Clark Bldg., Butte, Mont.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending April 11, 1914:

First Lieut. Harold O. Scott, granted leave for three months, effective on arrival in the United States.

For the week ending May 2d:

(No changes.)

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL 1914.

April 7.

No. 1,092,307, to JOHN L. TALBOTT and WALTER SCOTT WRIGHT. Dental instrument.

No. 1,092,553, to JAMES HERMAN ABBOTT. Process of producing dental suction.

No. 1,092,554, to JAMES HERMAN ABBOTT. Suction for dental plates.

No. 1,092,671, to MATTHEW SOUVIELLE. Dental jaw brace.

No. 1,092,701, to GEORGE S. EDWARDS. Dental instrument.

No. 45,572, to JULES J. SARRAZIN. Handle for tooth-brushes. (Design.)

April 14.

No. 1,093,125, to WM. C. J. GUILFORD. Impression device for dental use.

April 21.

No. 1,093,865, to CHAPIN F. LAUDERDALE. Sanitary shield for dental instruments.

No. 1,093,975, to GRAHAM CLARKE. Anesthetizer.

No. 1,094,203, to LESLIE E. EATON. Dental impression tray and detachable handle.

No. 1,094,269, to RICHARDSON H. TAYLOR. Dental crown remover.

No. 1,094,301, to ANSEL M. CAINE. Apparatus for administering anesthetics.

April 28.

No. 1,094,818, to ORIN C. SAMPHERE. Manually-operated rotary dental tool.

No. 1,095,018, to GLENN E. and JAMES G. MORNINGSTAR. Artificial teeth.

THE

DENTAL COSMOS.

VOL. LVI. JULY 1914. No. 7.

ORIGINAL COMMUNICATIONS.

PYORRHEA ALVEOLARIS AS A PREDISPOSING CAUSE OF CANCER OF THE ALIMENTARY CANAL AND ASSOCIATED PARTS.

By F. St. J. STEADMAN, D.P.H., L.R.C.P.Lond., M.R.C.S., L.D.S.Eng., London, Eng.,

DENTAL SURGEON, LECTURER ON DENTAL HISTOLOGY, AND TUTOR TO THE NATIONAL DENTAL HOSPITAL AND COLLEGE; DENTAL SURGEON TO THE METROPOLITAN HOSPITAL, TO THE BELGRAVE HOSPITAL FOR CHILDREN, AND TO QUEEN MARY'S HOSPITAL FOR CHILDREN.

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IT is my belief that cancer rarely occurs in any part of the body without a more or less long-standing chronic inflammation preceding it. I believe that a chronic septic condition of the mouth is by far the commonest predisposing cause of cancer. It is my object today to place before you the reasons upon which these opinions are based.

If it be true that oral sepsis is the commonest predisposing cause of cancer, considering how very common oral sepsis is, we should expect to find most cancers occurring in those parts of the body most commonly infected by the constant swallowing of pus—that is to say, the alimentary canal and its associated parts. In order to ascertain whether this is so or not, let us turn to the 67th annual report of the Registrar-general for England and Wales. This report gives tables showing the number of deaths from cancer during the years 1901 to 1904, and the different parts of the body affected. There is one table for the female and another for the male sex. The number of deaths from cancer during these four years was 114,130, or 5.3 per cent. of the total number of deaths occurring in the whole population of England and Wales. In these tables 776 cases in the female and 553 cases in the male sex are placed under a heading "parts not stated." I therefore deduct these from the total, giving the figure 112,801; of these, 67,480 cases occurred in females, and 45,321 in the males. Cancer occurs so frequently in the female sexual organs

that I propose for the moment to examine the cases occurring in the female body apart from these organs. We find, then, that of these 67,480 cases, 28,277 occurred in the sexual organs, and 39,203 in other parts of the body. Now, of these 39,203 no less than 33,910 occurred in the alimentary canal and its associated parts, or 86.5 per cent.

Now let us examine the 45,321 cases which occurred in the male sex. For the sake of consistency we must also exclude the sexual organs here, although, as a matter of fact, these cases are very few, viz, 1109. This leaves 44,212; of these no less than 37,645 cases occurred in the alimentary canal and its associated parts, or 85.1 per cent.

We see, then, that the great majority of cases of cancer, apart from those in the sexual organs, do actually occur in the alimentary canal and the associated parts, as we should expect to find if oral sepsis were a predisposing cause.

Before proceeding farther, I want to digress here for a moment to mention two cases which have a considerable bearing upon what follows.

The first came under my own observation about ten years ago. A powerfully built man, in apparently robust health, about 40 years of age, was one day stepping off the curbstone into the street, when he suddenly became aware of a motor bus bearing down rapidly upon him. He sprang sharply back on to the curb, and in doing so slightly strained his left knee. The injury was so slight that he thought very little about it, and continued his usual occupation for that day. Three or four days later, however, he was admitted to Charing Cross Hospital, under the care of the late Dr. Montague Murray, suffering from acute suppurative synovitis of his knee joint. He was transferred to the surgical side, and I believe the leg was eventually amputated. The interesting point in this case is, Whence had come the infection? At the time of the accident his leg was not knocked in any way; there was no external injury, therefore, of any kind whatever. Dr. Montague Murray made a thorough examination of his whole body, and could find no focus of infection. He then asked me to examine his mouth, whereupon the source of the infection was immediately seen. He had a very advanced pyorrhea alveolaris; his mouth was in a filthy condition, with deep pockets streaming with pus around all his teeth. The explanation given by Dr. Murray was that the "strain" had injured some tissue cells in the immediate neighborhood of the joint, and so lowered their vitality and resistance to invasion by micro-organisms. Consequently, the micro-organisms floating in the blood stream from his oral sepsis gained a foothold, with the disastrous result that followed. This case is mentioned in order to remind you how readily infection is conveyed through the blood stream.

For the second case I am indebted to Dr. Paschall, one of the resident house surgeons at the Metropolitan Hospital.

A woman, 61 years of age, was admitted to one of our London hospitals a few years ago suffering from an ulcer of the scalp. Four years before admission she sustained a cut head through falling from a trap. The cut became septic, and never properly healed, in spite of various treatments, but remained in a state of chronic inflammation. One year before admission a definite ulcer was present, which steadily increased in size up to the time of her admission. On admission there was a hard ulcer on the top of the scalp, the size of the palm of the hand, discharging blood and pus; the edges were raised and everted, and the ulcer was fixed to the skull. The occipital glands on both sides were enlarged. The ulcer was excised, with a margin of healthy skin, and eventually the wound healed. A microscopical section of the ulcer showed it to be an epithelioma. This case appears to show that a long-standing chronic inflammation predisposes to carcinoma.

Now let us return to the above figures, including the sexual organs, and taking both sexes together. For the purposes of this paper I propose to

divide these 112,801 cases into three classes, viz:

(1) Cases occurring in the alimentary canal and its associated parts.

(2) Cases occurring in the sexual organs.

(3) Cases occurring in all other parts of the body except the above.

In the first class we find 71,559 cases, or 63.42 per cent. of the whole; in the second, 29,386, or 26.05 per cent., and in the third, 11,856, or 10.52 per cent. As today I shall consider the cases in the first class in some detail, I shall briefly dispose of the other classes first.

Cases Occurring in the Sexual Organs.

(Class 2.)

The 29,386 cases which fall into this class are made up as follows:

Uterus	15,659
Female breast	11,364
Ovaries	1,254
Male breast	83
Prostate	366
Testis and penis	660
	29,386

It will be seen that each of these organs is closely connected with an *orifice* of the body, and therefore on that account liable to direct infection, as has been so ably pointed out and emphasized by that very sound surgeon, Mr. Peter Daniel.(1) Thus infection spreads to the uterus along the vagina; to the ovary via the vagina, uterus, and Fallopian tube; to the breast along the milk ducts opening on to the surface of the nipple; to the prostate, testis, and penis, via the urethra.

With regard to the uterus, it has long been recognized that cancer of the cervix is most liable to occur in married women who have borne many children, in those cases where the cervix has been lacerated and the tears have not properly healed. Herman says: "Cancer is especially apt to occur where there has been persistent local irritation, that is where nutrition has been impaired. During labor the cervix uteri is apt to be damaged, bruised, torn, *and afterward often inflamed.* The oftener such damage occurs the more liable becomes the cervix uteri to be the seat of cancer.(2) [The italics are mine.] We see, therefore, that here is a chronically inflamed surface commonly becoming the seat of carcinoma. Cancer of the fundus uteri seems to have little if any relation to child-bearing, as it is common in unmarried women. In married women it seems not unreasonable to suppose that chronic cervicitis may spread by continuity of tissue to the fundus, and so predispose to cancer. In unmarried women I suggest that a possible explanation is that the uterine cells, not having been put to their normal physiological function, may undergo some form of degeneration, and so become liable to infection, via the blood stream, from some septic focus elsewhere, commonly the mouth. In six cases of carcinoma of the fundus uteri in unmarried women I have seen, there was advanced pyorrhea alveolaris in each. Moreover, it is known that a septic condition of the vagina, as evidenced by leucorrhea, is common in virgins.

With regard to cancer of the breast, my theory is here strongly supported by Mr. Sampson Handley,(3) who states:

> The most important factor in the production of breast cancer appears to be chronic mastitis. Taking first the *clinical* evidence, Bryant found that out of 360 cases of cancer, mastitis had occurred at some antecedent period in 80 cases. Gross found similar evidence in 71 of 365 cases of cancer. Sheild found evidence of past inflammatory trouble in only 10 per cent. of the St. George's Hospital cases, but he justly points out that a focus of chronic mastitis, much too small to be clinically appreciable, may yet form an adequate nidus for a carcinoma. The clinical statistics, then, amount only to this—that there is evidence of past chronic mastitis in a large minority of cases of breast cancer.
>
> The *pathological* evidence, however, in favor of chronic mastitis as a cause is very strong. Beadles, from the examination of the non-carcinomatous portions of 100 cancerous breasts at the Brompton Cancer Hospital found, without exception, in each of these breasts such abnormal changes as un-

due proliferation of the acini and of the stroma, and cysts were of common occurrence. It must, however, be remarked that Lenthal Cheatle has found similar changes post-mortem in apparently healthy breasts. F. T. Paul, as the result of prolonged observations, recorded in 1901 his belief that microscopical evidence of mastitis is present in nearly every breast affected with carcinoma. Later Victor Bonney found traces of chronic mastitis in all the mammæ removed for early carcinoma which he had the opportunity of examining. Thus pathological investigation shows chronic mastitis to be an almost universal precursor of carcinoma.

The infection can, of course, take place either along the nipple ducts, or, what is probably more common, through the blood stream from some septic focus elsewhere, generally from some part of the alimentary tract, especially the mouth.

Speaking of vulval new growths, Victor Bonney states: "Squamous-celled carcinoma of the vulva is not uncommon, and its almost constant association with a pre-existing leucoplakic vulvitis has been noted." (4)

Mr. Peter Daniel says: "Sepsis, under a tight foreskin, with urethral infection, leads to desquamation of the epithelium of the foreskin and glans, to acute and chronic balano-posthitis, herpes, papillomatous warts, and soft sores. In every case of cancer of the penis I have seen a chronic balano-posthitis has always existed, and in cancer of the tongue, lip, and cheek, sepsis plays a most important part." (5)

In discussing the etiology of carcinoma of the penis, Russell Howard says: "There is also a precancerous condition similar to that met with in the tongue, and called eczema of the glans, Paget's disease of the penis, and leucoplakia, but which is really a chronic superficial inflammation of the glans penis and under surface of the prepuce. . . . Carcinoma usually develops if the condition is neglected." (6)

Numerous other well-known instances where chronic inflammations are liable to become cancerous could be given, but these must suffice, as the time at my disposal today is so short.

Cases Occurring in All Other Parts of the Body.

(Class 3.)

The 11,856 cases which fall into this class are made up as follows:

Bladder and urethra	2,112
Face	1,560
Arm, leg	1,287
Lung	1,039
Kidney, suprarenals	1,028
Brain	810
Pelvic bones	663
Mediastinum	654
Lymphatic glands	333
Thyroid	312
Globe of eye, orbit	298
Thorax	253
Spinal Column	207
Groin	169
Axilla	160
Shoulder	156
Nose	143
Rib, sternum	131
Ear	109
Scalp	108
Skull	97
Pleura	79
Hip	73
Spinal Cord	43
Buttock	27
Pericardium	5
Total	11,856

Looking at these figures, it is interesting to note what a large number of these organs are commonly the seat of chronic inflammation, such as the skin, bladder, and urethra, lung, kidneys, nose, and lymphatic glands, etc. That some of these chronic inflammations do predispose to cancer is well known and recognized, such as cancer of the scrotum in chimneysweeps. This form of cancer also occurs in other than sweeps, especially in those whose occupation favors saturation of the clothes with some irritant. Thus it has been noticed among employees at gas works, tar works, and chemical manufactories. The skin of chimneysweeps is very commonly incrusted with scaling and indurated patches. In many of them, even when they are thoroughly clean, the whole skin is dry, harsh, and dusky. (7) Other instances of epithelioma arising as a

result of precedent skin infection are cancer following eczema ani and Paget's disease of the nipple. Seaman's skin cancer is the name given by Unna to cancerous complications occurring after erythemata and hyperkeratosis of long standing, as result of exposure to weather.[8] In recent years there have been several well authenticated cases of cancer following upon the intractable ulceration occurring in X-ray dermatitis. The case of carcinoma of the scalp, which I have already mentioned this afternoon, is another instance of cancer following on a long-standing chronic inflammation.

Cases Occurring in the Alimentary Canal and Its Associated Parts. (Class 1.)

The 71,559 cases falling into this class are made up in the following manner:

Stomach	19,607
Liver and gall bladder	15,463
Rectum	8,698
Intestines	7,867
Esophagus	3,843
Tongue	2,784
Jaw	1,874
Abdomen	1,816
Lymphatic glands of neck	1,772
Peritoneum	1,529
Pancreas	1,436
Pharynx, throat	1,266
Larynx and trachea	1,107
Mouth	1,078
Lip	804
Parotid gland	223
Spleen	219
Mesentery	173
Total	71,559

Having seen, then, that elsewhere in the body, in those parts either on the surface or closely connected with an orifice, chronic inflammations are fairly common, owing to the ease with which direct infection can take place, and, further, that these chronic inflammations seem beyond a reasonable doubt—in some cases at any rate—to predispose to the subsequent development of cancer, I determined to investigate the condition of the mouth with regard to that disease known as pyorrhea alveolaris or chronic suppurative periodontitis in patients suffering from cancer of the alimentary canal and its associated parts, *i.e.* those parts to which infection can readily spread by continuity of tissue along ducts or along lymphatic vessels; because it is clear, and indeed is very well established, that the constant swallowing of infective material from the mouth is likely to produce chronic inflammation of these parts.

In carrying out this investigation it was necessary to have a control, or, in other words, to examine the mouths of persons not suffering from cancer, but who had reached the so-called cancer age of 35 and upward, that is to say, the age at which cancer first becomes fairly common.

The method of investigation adopted was very simple. It consisted of using the figures 0, 1, 2, and 3; 0 indicated that the mouth was entirely free from all traces of pyorrhea alveolaris, 1 indicated slight, 2 a moderate, and 3 an advanced case. Simple though this is, it is clear that different investigators might obtain widely different results, according to their ideas on the disease. In order that you may understand my results, it is of the utmost importance that I should endeavor to convey to your minds exactly what was in my own. It was extremely difficult for anyone to obtain an 0; it meant that the gums and periodontal membrane were absolutely healthy. In the 1 class I placed all cases showing a slight degree of periodontal disease. A considerable number of *very* slight cases were placed in this class, cases which it is safe to say that the great majority of medical men, and also a large number of dental surgeons, would have passed as being healthy. In the 2 class I placed all cases intermediate between the classes 1 and 3. In the 3 class I placed the advanced cases; by these I mean cases where the disease was not only advanced, but had been present a considerable number of years; cases where teeth had become very loose or had even dropped out, and which showed marked absorption of the alveolar ridge where the teeth had been lost. Eden-

tulous cases from which a history was obtained of the loss of teeth in this way and which showed this alveolar absorption were placed in this class, although the mucous membrane was often perfectly healthy at the time of examination, because these patients have obviously had many years of oral sepsis. In this class were also placed those very chronic cases in which there is a thickening of the alveolar process, and in which the pockets around certain teeth reach almost to the apices of the roots. In order to be able to compare the cancer cases with the control cases readily, it is necessary to have a fixed point. This fixed point I call the maximum pyorrheic index, which I obtain by simply multiplying the number of persons examined by 3. The figure obtained gives the highest possible mark which they could obtain if they all had the most advanced degree of pyorrhea alveolaris.

The number of persons suffering from cancer examined was 143. The following table gives the parts affected and the marks obtained:

TABLE I.

Part affected.	No. examined.	Number obtaining—			
		3	2	1	0
Tongue	34	29	5	0	0
Soft palate	5	5	0	0	0
Floor of mouth	3	3	0	0	0
Fauces	3	2	0	1	0
Tonsil	7	6	1	0	0
Throat	1	1	0	0	0
Parotid gland	1	1	0	0	0
Lip	5	5	0	0	0
Cheek	1	1	0	0	0
Angle of jaw	1	1	0	0	0
Glands in neck	1	1	0	0	0
Epiglottis	1	1	0	0	0
Larynx	13	8	4	1	0
Esophagus	6	5	1	0	0
Stomach	21	14	5	2	0
Pancreas	1	1	0	0	0
Gall bladder	1	1	0	0	0
Colon	5	5	0	0	0
Rectum	31	26	3	1	0
Anus	2	2	0	0	0
Total	143	118	19	5	0

It will be seen that of the 143 patients examined, 118 were given a 3, 19 a 2, and 5 a 1. There was not a single case free from pyorrhea alveolaris, indeed of the five cases obtaining 1, three were nearly sufficiently advanced to obtain a 2.

The maximum pyorrheic index is $143 \times 3 = 429$. The marks actually obtained were:

$$
\begin{aligned}
118 \times 3 &= 354 \\
19 \times 2 &= 38 \\
5 \times 1 &= 5 \\
\hline
& \ 397\text{—or } 92.54 \text{ per cent.}
\end{aligned}
$$

So that not only were 100 per cent. of these patients suffering from periodontal disease, but they actually obtained 92.54 per cent. of the maximum pyorrheic index. In other words, 92 per cent. of these patients had very advanced pyorrhea alveolaris. Indeed, of the 118 patients who were given a 3, from no less than 67 a history was obtained of teeth "dropping out," "working themselves out," or some similar expression; in every case where teeth had been lost in this way there was marked absorption of the alveolar ridges; in several cases they practically did not exist. Seventeen more had teeth very loose. Twenty-five patients showed more or less marked thickening of the alveolar processes, indicating that the disease had been present many years. The remaining 9 cases were allotted a 3, because their mouths were so filthy that I could not very well allot them anything else. Objections have been raised that the mouth always is in a filthy condition when malignant disease is present in it, that the sepsis is due largely to the growth, and that it is impossible to say how much was present before the growth originated. I do not think, however, dental surgeons have much trouble here. When histories are obtained of teeth "dropping out" years before, when the alveolar ridges where they have been lost show marked absorption, when the teeth present are very loose, or when the alveolar processes are thickened, it is quite obvious

that the malignant disease which has been present a few weeks or months cannot have produced these changes, which take *years* to bring about. All through my investigation I have been extremely careful to exclude all possibility of the periodontal disease having developed *after* the malignant disease, and in awarding the mark to each case have ignored the sepsis which in my judgment was due to the growth. The question arises, How many years does it take for the rarefying osteitis to advance sufficiently to allow the teeth to fall out? In other words, For how many years have these patients been swallowing pus? In my opinion, *from fifteen to twenty-five years,* as a rule. Sometimes, however, the disease runs a fairly rapid course, in which case the teeth would be lost sooner than in fifteen years, and in some cases I have reason to think it so slow that it takes even more than twenty-five years. In some of the cases examined a definite history was obtained of teeth "falling out" over a period of at least fifteen years, and as the disease must have been present a long time before the first tooth was lost in this way, one would very probably not be far wrong in estimating the duration of the disease in these cases as being from thirty to forty years. Further, it is by no means uncommon to obtain a history of chronic dyspepsia and chronic ill health during very nearly as long a period.

CONTROL CASES.

With regard to the control cases, the question at once arose as to where I should go for my material. It was clearly not fair to obtain it from the Dental Hospital, as there the patients come *because* they are suffering from dental disease. I rejected the idea of trying to gain access to His Majesty's prisons, on the grounds that the inmates there are probably of a low type, on the whole, and would be very likely to neglect their mouths even more than the usual run of the poor. Neither was it of any use to obtain the material from the army, as the majority of soldiers are under 35 years of age. The patients in the wards of the London hospitals also did not present the ideal ground for investigation, as the objection may be raised that a fair number of these patients are there because they are suffering from general disease secondary to, and in consequence of, their pyorrhea alveolaris, so that to a certain extent the same objection as to using patients at the dental hospitals holds good here. For this same reason the infirmaries and workhouses of London were rejected, and here there was the additional objection that inmates of these institutions are usually lower down in the social scale than the majority of the cancer cases I examined, and consequently more likely to neglect their mouths and their bodies.

I finally decided to obtain my material from two sources: (1) From the surgical wards of the London hospitals—I chose the surgical only rather than both surgical and medical, because most diseases due to pyorrhea alveolaris would be placed in the medical wards; and (2) from the parents and friends accompanying the children attending my dental department at the Belgrave Hospital for Children. This last seemed to be as good a source as I could obtain, because these people are carrying on their daily duties, presumably in their normal state of health. The only objection to it is the fact that the great majority are women. I do not know whether pyorrhea alveolaris is more common in one sex than in the other, and for this reason would have preferred to examine an equal number of both sexes, though my experience teaches me that there is probably very little if any difference.

415 persons over 35 years of age were examined—the maximum pyorrhetic index, therefore, being 1245. Of these,

66	obtained	3	=	198
123	"	2	=	246
170	"	1	=	170
56	"	0	=	0
415	"			614

That is to say, these 415 persons obtained 614 marks out of a possible 1245, *or* 49.00 *per cent., as compared to the*

92.54 *per cent. obtained by the cancer patients—a difference of no less than* 43.54 *per cent.* Exactly the same standard was of course adopted for the control as for the cancer cases. Every person who had had teeth drop out, or had very loose teeth, or who had marked thickening of the alveolar processes, was given a 3. These only numbered 66 out of 415, while there were 109 among the 143 cancer patients—so that from this point of view alone the difference is very striking. It is interesting to note that no less than 86.5 per cent. of these control persons were suffering from periodontal disease, and only 13.5 per cent. were entirely free from it. If we merely ask what is the percentage of persons over 35 years of age in the poorer classes not suffering from cancer who have pyorrhea alveolaris, compared with those in the same class suffering from cancer, the answer is 86.5 per cent. in the first case, and 100 per cent. in the second. The difference here is not very marked. It seems to be the *degree* of pyorrhea that matters. *It seems to be the number of years that pus has been swallowed that counts.*

One morning, while examining some people for this control, I had to reject three in succession who had perfectly healthy mouths, because they were just under 35 years of age. I fell to wondering at what age pyorrhea alveolaris became common, and determined to investigate this point also by examining people at each of the eleven age periods. I went to the same sources for my material here as before, except that to obtain the children I went to Queen Mary's Hospital for Children at Carshalton, where I am dental surgeon. At this hospital, which is a very large one, I examine all their mouths. They do not come to me because of dental disease, so that the objection I had to dental hospital patients did not hold good here.

I found considerable difficulty in obtaining material for the last two or three age periods, and I was driven to the infirmaries and workhouses for this. I also found it difficult to obtain material for the fifth period. The following—Table II—gives the results obtained:

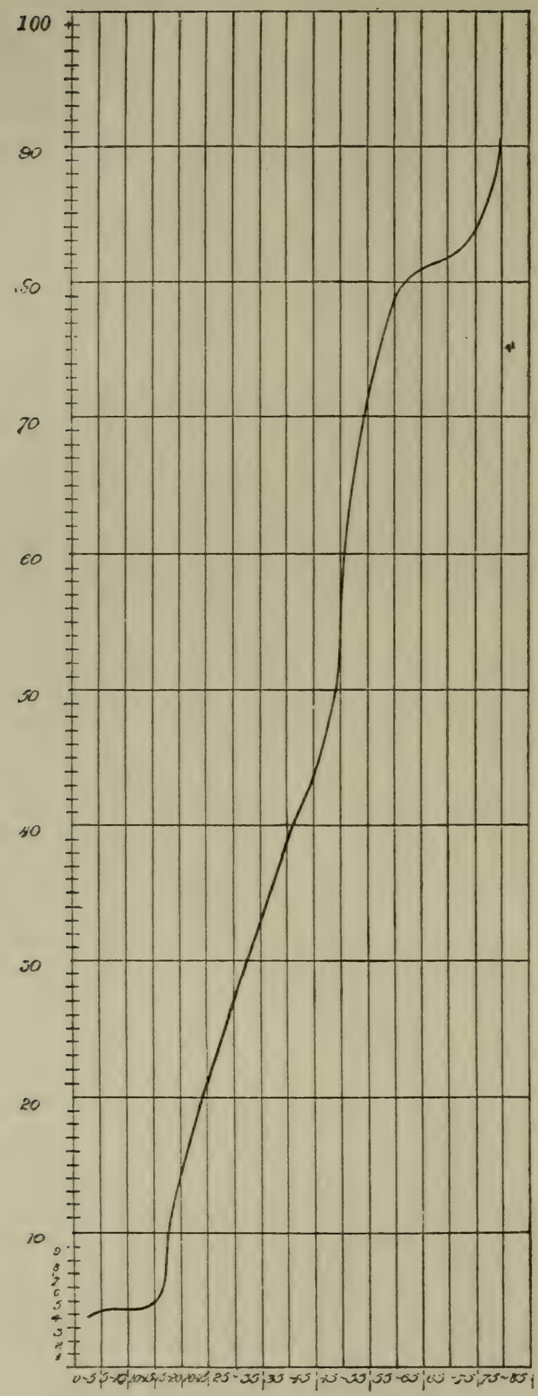
TABLE II.

Age period.	No. examined.	No. obtaining—				Percentage of maximum pyorrheic index.
		3	2	1	0	
0– 5	167	0	1	18	148	3.96
5–10	320	0	4	30	286	3.96
10–15	255	0	0	34	221	4.44
15–20	100	0	3	26	71	10.66
20–25	39	0	2	17	20	17.95
25–35	182	0	27	95	60	27.29
35–45	236	14	59	120	43	39.55
45–55	100	21	29	43	7	54.66
55–65	49	26	17	4	2	78.9
65–75	29	17	9	2	1	81.61
75–85	35	25	10	0	0	90.43

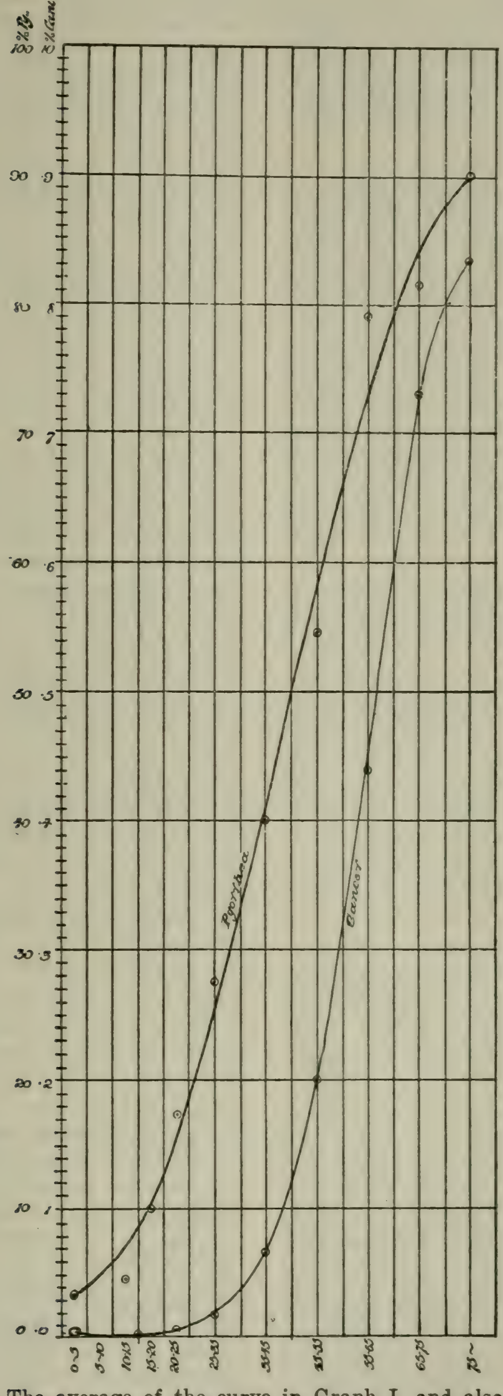
It is interesting to note that no person under the age of 35 obtained a 3. I have seen patients much below this age to whom I should allot a 3, but these cases are comparatively rare, and I did not happen to come across one during my present research. This fact bears out in my opinion that it takes many years for the disease to become advanced. A

good number of dental surgeons hold that true periodontal disease does not occur in children. I can, however, definitely state that this is quite wrong. I have been able to pass my probe into definite and unmistakable pockets from which pus could be squeezed around deciduous teeth. I have seen the marginal gingivitis of the early stages, and the loosening of the teeth from rarefying osteitis and the exposure of the roots, together with the constitutional symptoms of the later stages. Indeed, in one case I saw some few years ago, a boy of about 7 years of age, I should certainly have allotted a 3. From these figures I have plotted a curve showing graphically the amount per cent. of the maximum pyorrheic index present at the different age periods in the 1512 persons examined. (Graph I.) I have also constructed a curve showing the cancer mortality per cent. in both sexes together, in England and Wales during the years 1905 to 1909, at the same eleven age periods, from the figures given in the 73d annual report of the Registrar-general. (Graph II.) The first graph shows the pyorrhea curve drawn exactly according to the figures in Table II. On the second graph are drawn two curves. The upper one is the same pyorrhea curve, only instead of drawing it exactly to these figures an average has been taken, though the actual figures are indicated by dots. I am, I think, justified in taking this average for two reasons: First, because the number of persons examined is small compared to the number on which the cancer curve is based, and secondly, because it is obviously impossible to estimate *precisely* the amount of pyorrhea present in each individual patient as compared with another patient examined perhaps several months before. In the cancer curve, based as it is on actual deaths, this difficulty does not arise. It *must* be accurate if the ages given on the death certificates are correct. The lower one is the cancer curve drawn to a scale 100 times larger than that of the pyorrhea curve. This difference in the scales does not, of course, alter the *shape* of the curves; it is merely a matter of convenience, as otherwise one would have to use such a very large sheet to show both of them. In comparing these two curves, it is clear that there is a most extraordinary similarity between them, except that the pyorrhea curve rises earlier, and is always well in advance of the cancer curve. This bears out the figures I have already placed before you. These figures, as I have indicated, to my mind seem to show that it takes many years of swallowing septic material before the development of malignant disease. It must be borne in mind, too, that the cancer curve is swelled by the inclusion of cases in classes 2 and 3. The bend to the right at the top of the pyorrhea curve is, I think, explained by the fact that periodontal disease commences to be fairly common in the young adult, so that at 65 these patients have reached the final stage of the disease—that is to say, the absorption of the alveolar process has advanced to the degree that the teeth fall out, and so they obtain a 3. At 65 a very large number are in this plight, and the curve has almost reached its highest point at this age period. It is interesting to note that the cancer curve also makes the same bend to the right at the top. I suggest that this is explained by the fact that at 65 years of age a great number of people are edentulous, and that some of these commence to recover from the effects of their oral sepsis as soon as the last tooth has gone. They thus become less liable to malignant disease. Not all recover, however, by any means, nor is this to be wondered at. A stomach which has been receiving pus for some fifteen to thirty years is very frequently permanently damaged. It is beyond repair, and the chronic gastritis remains, even though the original source of the infection has been removed. These facts explain, I think, why it is that the two curves become closer together in the last age periods. The malignant disease developing in old people of 75 and upward is the result, I think, not so much of their oral sepsis present at that time, but of the very many years of sepsis which have gone before.

I now propose, commencing at the



GRAPH I: A curve showing the percentage of the maximum **pyorrheic** index present in the poorer classes at each age period.



Graph II: The average of the curve in Graph I, and also a curve showing the cancer mortality per cent., at each age period, occurring in England and Wales during 1905–09.

mouth and proceeding downward, to place before you some clinical evidence which, to my mind, supports my contention that oral sepsis predisposes to the development of cancer in the alimentary tract.

THE MOUTH.

Epulis. The first tumor in this region to which I wish to call your attention is that loosely described as an epulis. Every tumor of this nature I have seen has occurred in close connection with a septic stump or tooth. Such tumors spring from the chronically inflamed alveolo-dental periosteum. Innocent at first, they are very liable to recur, and eventually to become malignant, unless thoroughly and completely removed, together with the piece of bone to which they are attached, and the septic stump or tooth.

Epithelioma of the gum. Dean says that these tumors nearly always originate in the neighborhood of a decayed tooth.(9) Writing of this tumor, Colyer says: "A common starting-point is the margin of the gum, generally the outer aspect, adjacent to a tooth which has been the seat of a long-continued sepsis. In such a case the chronic irritation seems to have determined the growth of the epithelioma. This tumor may originate in the hard palate, where in some cases it may be traced to the chronic irritation of a badly fitting denture. . . . There is little doubt that in many of these cases a simple ulcer is present for some time, associated with sepsis, before malignant change occurs."(10)

THE TONGUE.

In every case of carcinoma of the tongue I have seen up to the present, a long-standing chronic septic condition has preceded it. In the 34 cases examined during the past year, 29 received a 3, and the remaining 5 a 2. In only 10 of these cases was a history obtained of the growth being started by rubbing against sharp teeth or stumps. In one case the growth commenced at a spot which had been made sore by being rubbed by a vulcanite pipe-stem. Clayton-Greene says: "Whatever the future may have to show as to the cause of cancer, in no situation do the predisposing causes of irritation and inflammation play such an important part in encouraging the disease as in the tongue."(11)

Mr. Charles Ryall, in a very interesting and most instructive lecture on cancer of the tongue, delivered at the Cancer Hospital on February 12, 1913, said that cancer of the tongue was almost invariably preceded by a long-continued chronic irritation. He said that by far the commonest cause of this irritation was syphilis, combined with excessive tobacco smoking. Later on, when dealing with the preventive treatment, he emphasized strongly the great importance of treating the syphilis thoroughly, and, when chronic superficial glossitis had supervened, he urged the necessity of forbidding tobacco and of removing any sharp stumps which might be present. In the light of my own research, while thoroughly appreciating the importance of these two etiological factors, I am convinced that he has overlooked the third extremely important one, namely, chronic suppurative periodontitis. Cancer of the tongue occurs in patients who not only have not had syphilis, but also who do not smoke. It occurs, for example in women—though much less frequently than in men—where both these factors, especially tobacco smoking, are less common. The last report of the Registrar-general for England and Wales shows that in the ten years 1901-10 there were 854 cases of cancer of the tongue in women against 7092 cases in men.

It is not uncommon to find a chronic superficial glossitis, sometimes limited to the margin, in patients suffering from suppurative periodontitis who do not smoke and from whom no history of syphilis can be obtained. Nor is this surprising when it is realized that the tongue is constantly rubbing against the septic pockets around the teeth from which pus is exuding. Moreover, the organisms producing this pus are virulent enough to bring about the destruction of the bony alveolar process.

With regard to the preventive treat-

ment of cancer of the tongue, while thoroughly agreeing with the methods advocated by Mr. Ryall, I would go further, and not *only* remove the sharp stumps, but would also treat the periodontal disease, even if this involved the sacrifice of all the teeth.

Floor of mouth, soft palate, fauces, tonsils and pharynx. Of the 19 cases examined of cancer in these regions, 17 obtained a 3, one a 2, and one a 1. All these cases, therefore, with possibly a single exception, had had oral sepsis for many years. The close proximity of these parts to the septic and inflamed gums renders them very commonly the seat of chronic inflammation also. One patient under my care had had frequent attacks of tonsillitis for years, on one occasion even going on to suppuration. He has had no attack since the cure of his pyorrhea alveolaris, five years ago, although previously he had rarely passed a year without having an attack. One case of carcinoma of the palate I examined was that of a man only 28 years of age. Nearly all his premolars and molars had *dropped out several years before*—so many years previously that he could not say exactly how many. There were deep pockets, reaching almost to the apices, around nearly all the teeth present. Several of these teeth were very loose. As I have already pointed out, I did not meet with a case nearly as advanced as this in my control cases under 35 years of age. His mouth was that of an old man of 60 or 70. Here, then, is a man who has a most unusually advanced periodontal disease for his age, developing a carcinoma at an early age.

Larynx. Thirteen patients with carcinoma of the larynx were examined; 8 obtained a 3, 4 a 2, 1 a 1.

The following cases are fairly typical:

CASE 75. Woman, age 51; 3. Edentulous. All her teeth were removed twelve or thirteen years ago by her doctor's orders. He said they were injuring her health. The alveolar ridges are poorly formed. In the lower incisor region there is practically no ridge at all. She has had a "relaxed throat" for years. She cannot remember how long; she thinks at least twenty years. It began by an acute attack, in which she lost her voice for some days. She has frequently "caught cold" in her throat since. She loses her voice in these attacks.

She has now a carcinoma of the larynx, which has developed during the past year.

It seems not unreasonable in this case to suppose that this trouble in her throat was a chronic laryngitis, which was possibly a result of the septic condition of her mouth before the teeth were removed.

CASE 140. Man, age 49; 2. Advanced pyorrhea alveolaris of the very chronic type, that is to say, the alveolar processes are slightly thickened all around the mouth. His present trouble, cancer of the larynx, first gave rise to symptoms about twelve months ago. He says that he has been subject to sore throat for the past fifteen years or so. He has had sometimes two attacks a year.

The esophagus. Six patients were examined with cancer of this region. Five obtained a 3, and one a 2. The following is one of the cases:

Man, age 50; 3. Eighteen months ago he was being treated for gastritis. His doctor ordered all his teeth to be removed on account of their septic condition; this was done. The alveolar ridges were well formed in the upper and lower incisor region but markedly absorbed everywhere else. His present trouble, cancer of the esophagus, first gave rise to symptoms about eighteen months ago.

Stomach. Twenty-one patients were examined suffering from cancer of the stomach; of these, 14 received a 3, 5 a 2, and 2 a 1. The evidence for the statement that oral sepsis may produce a chronic gastritis is overwhelming. It is the almost daily experience of surgeons, physicians, and dental surgeons that the removal of septic teeth will frequently cure a chronic dyspepsia. Sir W. H. Allchin says: "The symptoms of chronic gastritis are essentially those of a chronic gastric dyspepsia, since that is the usual morbid state underlying the clinical complex known as chronic gastric indigestion, when that malady is not purely nervous in origin. It may become established as a sequence of acute gastritis, or may slowly develop without any defi-

nite commencement, as the result of obstructed portal circulation, *of continued infection from oral sepsis,* or in the course of chronic toxemias, such as gout, chronic nephritis, etc." (12)

James Sherren states that oral sepsis is present in most patients with chronic gastric ulcer. Mayo Robson believes that this is an important causal condition in a large number of cases. (13) Peter Daniel says: "That a dermatitis may develop into an ulcer is obvious, and why a gastritis is denied the capacity to develop into a gastric ulcer I fail to understand. The clinical evidence for this statement is so overwhelming that I cannot fail to accept the view in general, though I do not for one moment overlook the other modes of conveyance of infection, *i.e.* by the blood stream, lymphatics, by contiguity, nor the effect on the mucosæ of the excretion of toxins developed elsewhere." (14) The same author, in another place, gives what is to my mind strong clinical evidence in support of his views. (15)

Writing on gastric cancer, Sherren stated: "It is held by all surgeons who have worked out the question that chronic gastric ulcer predisposes to the development of carcinoma. Evidence of this has been gradually accumulating since its possibility was first discussed by Cruveilhier in 1839 and Rokitansky a year later. Dittrick in 1848 described 6 cases in which carcinoma developed in the immediate vicinity of active or healed ulcers. . . . Among 87 patients with carcinoma of the stomach, upon which I operated up to December, 1911, there was in 31 a definite history pointing to chronic gastric ulcer symptoms having been present for from five to twenty-eight years. Mayo Robson, in cases in which he operated, found a suggestive history in 59 per cent.; Moynihan, in 60 per cent. The most convincing evidence has been put forward by Wilson and MacCarty as the result of their examination of specimens removed by operation in the Mayos' clinic. In 71 per cent.—109 out of 153 cases—there was naked-eye and microscopical evidence that carcinoma had developed in preexisting ulcers. There can, in my opinion, be no doubt that gastric ulcer is a predisposing cause of cancer of the stomach in a large proportion of cases." (16)

We see here then, I think, strong support for my view that oral sepsis may produce a chronic gastritis, which in some cases goes on to ulceration and thence to malignant disease. It must be remembered, too, that there are probably many people suffering from chronic gastritis, and even gastric ulceration, in whom these morbid processes give rise to no symptoms. A few months ago I saw a man who had been operated upon for perforated gastric ulcer, the first symptom of which was acute abdominal pain due to the perforation. He had had no dyspepsia or any other symptom whatever previously. His teeth had been "dropping out" for several years.

In examining these 21 cases, I went carefully into the history of past dyspepsia. One gave a history of having suffered in this way for 20 years; 2 more for 10 years; 2 for seven years; 1 for six years; 1 for 4 years; 1 for 3 years; 3 for 2 years; 2 for 18 months; 1 had had dyspepsia as long as he could remember; another for many years, he could not say how many; two patients were too ill to obtain a history, and in only 4 cases was there no definite history of a previous dyspepsia. The most interesting and striking case of the series was the following:

Case 103. Girl, age 16; 2. She has an advanced phyorrea alveolaris. There are deep pockets around the lower incisors and canines, and also in the upper molar and premolar region, from which pus can be squeezed. The interdental papillæ are spongy, and very distinctly thickened all around the mouth. The gums bleed readily. There is marked thickening of the alveolar process in the upper molar region on both sides. The upper teeth are crowded, the second premolars being crowded completely out of the arch on the lingual side.

There is a septic stump of the lower right first molar, but no other sign of caries present.

Present trouble. She was quite well up to eight months ago, when she commenced vomiting after meals. For the last eight months she has suffered a great deal from flatulence. She has a large primary growth in the stom-

ach, and several secondary deposits in the cervical glands. One of the largest of these glands had been removed and examined microscopically, and found to be carminomatous.

This is an extremely interesting case on account of the age of the patient. It is most remarkable that a patient so young as she should have such an advanced pyorrhea alveolaris. In her case I found it difficult to decide whether to allot her a 2 or a 3. I was never in such doubt with any of my control cases in so young a subject. She was easily the most advanced case of any I examined under the age of 35, with the single exception of a man aged 28, already mentioned. It is significant that these two most remarkable points about this case, the cancer and the advanced pyorrhea alveolaris, should be found together. Judging from the condition of her mouth, I am of opinion that she has been suffering for at least ten years from periodontal disease.

Gall-bladder. With regard to the routes of infection of the gall-bladder, I think it is now generally admitted that inflammation does in some cases spread by continuity of tissue from the stomach to the duodenum, and thence along the common bile duct and cystic duct to that organ. It may also, of course, become involved by infection spreading upward from lower down in the small intestine, or via the blood stream. That this septic infection frequently leads to the formation of gall-stones, and that these two factors together, viz, gall-stones and sepsis, frequently result in malignant disease, is also, I think, well established. G. Grey Turner states that in over 80 per cent. of cases, gall-stones and cancer are associated. ([17]) Mayo Robson states that it may be taken as proved that gall-stones owe their origin to a bacterial invasion of the bile channels giving rise to a catarrh of the mucous membrane, and a deposition of that portion of the cholesterin secreted which is in excess of what the bile salts are able to hold in solution. ([18])

The organism most commonly found is, according to some authorities, the bacillus coli communis, but the typhoid bacillus, staphylococci, and streptococci have been frequently found. These last two are very frequently obtained from the pockets in pyorrhea alveolaris. The following case of gall-stones seems to support my contention:

Case 5. A woman, age 40; 3. Had suffered for the past ten years from chronic dyspepsia. She had had occasional slight jaundice during the last five or six years. Two years ago she had an attack of severe pain, lasting three or four hours, in the epigastrium, accompanied by vomiting, and followed by collapse. She had two attacks later. A diagnosis of gall-stones was made, and subsequently confirmed by their removal by operation. She had an advanced pyorrhea alveolaris of long standing, as shown by her statement that she had lost many teeth, owing to their becoming loose and dropping out. She had been losing teeth in this way for many years; she could not remember how many; at any rate she was sure that it commenced before the dyspepsia. The alveolar ridge where the teeth had been lost showed very marked absorption. All the teeth she then had had deep pockets around them, reaching in some cases almost to the apices of the roots. A quantity of pus could be easily squeezed out from all these pockets.

This case is very interesting, because the patient showed, by her various symptoms, apparently the course of infection. The dyspepsia was no doubt, I think, due to chronic gastritis, caused by the swallowing of pus from the pyorrhea alveolaris. The inflammation spread to the duodenum, and thence along the common bile duct and cystic duct, as shown by the attacks of jaundice, to the gall-bladder, with the resulting formation of gall-stones. I think it is reasonable to infer that had the gall-stones not been removed, the septic condition of the gall-bladder, together with the gall-stones, might eventually have brought about cancer of that organ, in which case it would surely be fair to say that the chief predisposing cause was the oral sepsis.

Rectum. I examined 31 cases of cancer of the rectum; 26 obtained a 3; 3 a 2; and 1 a 1. Mr. Peter Daniel informs me that of 54 cases coming under his

care in the past eight years, every one had more or less marked oral sepsis. He also tells me that in his experience cases of colitis and proctitis do not clear up satisfactorily until the oral sepsis has been attended to.

The question arises, How can the large bowel be infected from the mouth, which is such a long way off? I think there are four possible explanations:

(1) That the organisms entering the stomach with the food are passed along the whole length of the small intestine with its contents.

(2) Infection via the blood stream.

(3) That the toxemic absorption from the pyorrhea alveolaris lowers the vitality of the body generally, and with it the bowel, enabling the organisms normally present in it to start an inflammatory process, although when the bowel is in its normal condition they are harmless.

(4) Downward spread of the inflammation by continuity of tissue from the stomach—this latter path being probably very rare.

There is some bacteriologic evidence in support of the view that infection from the mouth can occur, *e.g.* certain varieties of streptococci constantly found in the mouth have been found in the stools. It may be asked, Why, if oral sepsis can bring about a precancerous inflammation of the large bowel, is cancer so comparatively rare in the small intestine? I think the explanation is that the contents of the small intestine are liquid, and pass along quickly, whereas in the large bowel they are more or less solid and hard, and remain a long time *in situ,* so that here we have an additional factor, namely, *friction* on a chronically inflamed surface.

The following case is typical of the cases examined, except that the patient is unusually young, both for the periodontal disease and for the carcinoma:

CASE 106. Woman, age 29; 3. She has advanced pyorrhea alveolaris. She has "worked" several teeth out themselves when they became loose. The alveolar processes are thickened all around the mouth, and the interdental papillæ absorbed in the upper incisor region.

Her present trouble, cancer of the rectum, first gave rise to symptoms about a month ago.

Such, then, is the evidence which has convinced me that pyorrhea alveolaris is by far the commonest predisposing cause of cancer of the alimentary tract. To sum up this evidence, we see—

(1) That apart from the sexual organs, over 86 per cent. of all cancer occurs in the alimentary tract.

(2) That long-standing chronic inflammation in the sexual organs and in other parts of the body is known to predispose to the development of cancer.

(3) That the great majority of persons suffering from cancer in the alimentary canal have advanced pyorrhea alveolaris which has been present very many years.

(4) That this advanced periodontal disease is not nearly so common in persons not suffering from cancer.

(5) That it is a well-known fact the constant swallowing of pus can, and does, in many cases, bring about chronic gastritis.

(6) That the majority of patients suffering from cancer of the stomach have had chronic gastritis for many years prior to the development of the malignant disease.

In conclusion, I must thank my colleagues at the Metropolitan and Belgrave Hospitals for their kindness in allowing me to see their cases. I must also thank the medical staffs of the Cancer and Middlesex Hospitals for so kindly allowing me to see cases in their wards. Lastly, I must thank Mr. Morson, the cancer registrar at the Middlesex Hospital, for his courtesy and assistance in obtaining material.

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ARE WE MAINTAINING OUR HIGHEST IDEALS?

By C. N. JOHNSON, M.A., L.D.S., D.D.S., Chicago, Ill.

(Read before the Connecticut State Dental Association, at its annual meeting, Hartford, April 21, 1914.)

IT is well for the profession to pause occasionally, and take stock of its status, to see whither it is drifting. In some respects the profession of today seems to be progressing most satisfactorily.

DENTAL EDUCATIONAL METHODS.

In dental educational methods there is a healthy advance, and while there are many reforms yet to be worked out, the general trend in education is in the right direction. Men are devoting their energies more and more assiduously toward the development of improved methods of instructing students in the science and art of dentistry. That these methods are always symmetrical, no one can claim, and that too much emphasis is placed on some subjects and too little on others, no one will deny; but the improvement during the last decade is most marked, and may well be a cause for congratulation to those most active in educational circles. There is a growing tendency to standardize dental education through the formation of national and international organizations which deal with educational policies and methods, and if the recent past and the present are any augury of what is to come, there need be little concern about the future. It is true that some schools are still very far behind in their teaching methods, and fall lamentably short in their annual product, but these institutions are being more carefully singled out in published reports of the standing of colleges, and it is hoped that a general reform will result. It is not just that those schools which are striving to the utmost limit of application and energy, and which are yearly improving

their curricula, should be classed with or judged by the reputation of some of the inferior institutions, and it is a move in the right direction to carefully classify colleges, and thus to create a sentiment leading to the improvement of those which are known to be weak or lax. This question is one which might profitably be discussed at greater length, but this is not the opportunity.

DEVELOPMENT OF TECHNICAL SKILL.

Another direction in which the profession is making satisfactory progress is the perfection of the technique of our work. There never was a time in the history of dentistry when so many men were able to do such exquisite operations as we see today. The technical development of the profession is being brought to a high state of perfection—in fact much lamentation has gone up from certain quarters to the effect that this phase of dentistry has been advanced at the serious sacrifice of other and more important factors. It is seldom that any profession grows in a perfectly symmetrical manner, and it is not strange that men have followed certain leads more assiduously than others. If technical dentistry has appealed in the past to a larger number of men than has pathology or histology or chemistry or anatomy, while in one sense this may seem unfortunate, yet the fact is as it is, and no one man or set of men could have stemmed the tide. Colleges have been severely criticized for teaching so much technique and so little pathology, and it is true that in some institutions there is a deplorable lack of application to such subjects as pathology, diagnosis, etc. But that too much attention is being given to technical perfection either by the colleges or by practitioners is a mistaken idea. There can be no possible question of the insistent necessity for a high order of manipulative ability on the part of the dentist, if he is to serve his patients acceptably; in fact, in no other pursuit of life is there such a manifest demand for digital skill and delicacy of touch as there is in the practice of dentistry. To those, then, who decry the emphasis which is being placed upon this phase of our teaching must be brought home the conviction that their point of view is wrong. It may be necessary to strengthen our teaching in some of the other departments, but never for a moment at the expense of the technical. This must be maintained at its present high order, and in many instances it must even be vastly improved.

THE DECLINE OF PROFESSIONAL IDEALISM.

The fact just alluded to, that we find more work being done of a high order of technical skill than ever before, must be a source of satisfaction to those who are watching carefully the tendencies of the profession; so accordingly, in this one direction our progress seems satisfactory. But there is one condition to which I wish at this time to call particular attention, and which would seem to loom high on the horizon as a future possible menace to the best traditions of dentistry. In the incessant activities of the day, with our intense application to mechanics and the mad rush of commercialism which surrounds us on every side, and which in fact is sometimes said to be permeating our ranks, there is grave danger that we may lose something of the high professional ideals which came down to us as a heritage from the founders of the profession, and which have always formed one of our most cherished assets so far as the maintenance of a real professional status is concerned. The essence of the true professional spirit is expressed chiefly in self-sacrifice for the general good, and while we see much of this today, yet the conspicuous examples of it are not so noticeable, relatively to the numbers in the profession, as we find in reading the history of dentistry of earlier times. This seems to me a real cause for anxiety, because, without our ideals, we would soon drift into commercialism pure and simple. The statement may be made in contravention of this that in the early days of which I speak there

were many practices current among dentists which would not be tolerated today; that public advertising, for instance, was considered legitimate; that, in fact, there was little appreciation of ethical practice, and that men peddled their profession about, much as a man with a pack on his back or a tinsmith repairing pots and cans. Some of this is undoubtedly true, and yet it would be difficult to match among our predecessors the ingenuity of deception practiced by some of our modern "dental parlors." On the other side of the picture we have the record of men of the early days who made sacrifices the like of which I fear we cannot find in the present age—men, for instance, like that noble band who issued the first dental journal purely for the benefit of the profession, and who bore the expense of publication from their own pockets. In the first volume of the *American Journal of Dental Science*, published in 1839, will be found a list of thirteen men who subscribed in the aggregate for 300 copies at $2.50 each, making a total of $750, so that the expenses of publication might be assured. Two men, Chapin A. Harris and Eleazar Parmly, subscribed respectively for 40 copies, making $100 each, while many men paid for two subscriptions. Incomes from the practice of dentistry in those days were not as great as they are today, and it was no small matter for those men voluntarily to subscribe the necessary funds that a dental periodical might appear. It was public and professional spirit of a high order.

THE CRAZE OF MODERN COMMERCIALISM.

We need more men of the type of the old stalwarts of those days, men whose sense of professional dignity and responsibility lifted them above the sordid consideration of monetary advantage, men who—some of them—were so imbued with professionalism and so devoid of commercialism that, in certain instances, it even constituted a real fault, but whose influence always tended toward the elevation of the profession, and whose example placed dentistry on a more secure footing before the world. I could mention names by the score to indicate the type of men I mean, but a few will suffice for illustration. At random let me recall Harris and Hayden, Atkinson and Dwinelle, Varney and Webb, Taft and Miller, Dean and Cushing. Where today can we find their counterparts? And is it not a distinct loss to dentistry that we have so few such men?

I fear that the rush of the age is not conducive to the cultivation of that calm poise which is so necessary for the development of true professionalism, and it would seem well for us to pause and study the possible result of our present tendencies.

What, for instance, would have been the attitude of any of these men whose names I have mentioned toward the widespread and continued consideration of the possible dollars and cents to be made in dentistry? The profession seems to have gone money-mad with the rest of the world, and apparently has little taste for periodical or other literature except that which discusses the financial side of practice. Undoubtedly there are men among those named who paid too little attention to the material side of life, and whose old age was saddened by want due to this fact. Undoubtedly it is perfectly legitimate to teach our young men good business principles, to the end that they may develop into responsible citizens, financially and otherwise; but to continually harp on the money side of dentistry to the exclusion of the scientific or professional side is demoralizing in the extreme. We need more and more to hold up before our students and young practitioners the banner of an unstained professional dignity and grace, so that they may grow into higher and still higher ideals of professional conduct. We write a code of ethics embodying the essence of all we understand in the way of correct professional living, and we compel those who join our dental societies to sign this code and live up to it. This may be necessary with our existing tendencies, but how much better it would be if we could instil into every practitioner

the spirit which the code is supposed to represent, and not be obliged to bind him down by formulated and printed rules.

A PLEA FOR HIGHER PROFESSIONAL ETHICS.

The time has come when we should turn the tide of our consideration more in the direction of unselfish professionalism, and not worry so much over the dollars we are to make. To make money the chief aim—however important money may be—is to demoralize us individually and collectively, and to stultify our professional manhood. Better far to be considered quixotic and professionally punctilious, than to sell our ethical birthright for a mess of commercial pottage.

I am quite aware that to cultivate a high order of professional consciousness among the rising generation of dentists is to go directly against the sweeping current of present-day tendencies. Within the professions and without, men are discussing the dollar as they never did before, and there is a danger throughout our whole social fabric of a lowering of ideals of life and conduct, which will ultimately result, if not checked, in a disintegration of our manhood.

Repeatedly in recent years our thinking men, seeing the trend of events, have pointed out the fact that, while money is important and necessary, it is not the *summum bonum* of our existence, as so many people have come to believe. Money was never worshipped as it is today, and this worship is proving a distinct menace to our mental and moral growth. It is against this rushing tide of money madness that the profession must make its firm stand, if its traditional ideals are to be preserved or advanced. And we of today, in the midst of present activities and with so much of promise in our future possibilities, have a distinct duty to perform in directing the destinies of the profession into proper and legitimate channels.

Much as the profession has to be thankful for in latter-day developments connected with the science and art of our calling, we shall still fall far short of coming into our true heritage if we neglect the thing which to me seems paramount to all others—the elevating influence of the highest professional and ethical ideals.

[The discussion will be reported under "Proceedings of Societies," in August issue.]

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, D.D.S.Univ.Pa., L.D.S.Edin., Edinburgh, Scotland.

(Continued from page 702.)

(III.)

CHAPTER V.—Preliminary Preparation of Roots for Crowning and Bridging.

Before proceeding to give a detailed description of the necessary steps in the preparation of a root or roots for the purpose of crowning, it is proposed to describe briefly the treatment which should be adopted before these preparations are made; and as it is assumed that the reader is acquainted with the general principles which govern this treatment, no attempt will be made to deal exhaustively with this subject.

As a preliminary step, then, it is of course necessary to make a thorough and careful examination of the mouth, and to decide which teeth or roots are likely to prove servicable. Some may have to be relegated to the doubtful class and so retained until treatment has proved them worthy or unworthy of retention. Those which are loosened from much absorption of their alveoli, or are the seat of abscess with extensive caries involving their walls, or are so permeated by decay as to afford doubtful anchorage, should be removed, as well as all calcarious deposits, and the teeth should be thoroughly polished.

Devitalization and Extirpation of the Pulp.

The question of devitalization as a preliminary step to crowning is one which some writers seem to approach with timidity, and the reason for such caution does not seem to be well founded. Experience has proved that the life of a tooth deprived of its pulp is as long, and in many cases longer, than when the pulp is left alive, assuming that the various steps of the operation have been thoroughly and carefully carried out. Devitalization proves most successful between say twenty-five and fifty years of age. Before and after this period the percentage, while still large, is not so great. The dangers arising from the crowning of teeth in which the pulp has not been removed are so great that few experienced operators care to run the risk involved in their retention. The law that every rule has its exception applies here as elsewhere, and where there are sound reasons for believing that extensive or complete calcification of the pulp has taken place, and that the chances are remote of being able to remove satisfactorily what remains, then such teeth may be crowned with but slight probability of future trouble; but a careful record of their condition should be kept, in view of possible pain or discomfort later on.

The necessity for devitalization of the pulp having been decided upon, the method whereby this may be accomplished will depend upon the nature of the case and attendant circumstances. These vary widely, and in consequence the methods of treatment exhibit a considerable choice of procedure; this must always be exercised with a view to ac-

complishing the desired end with the smallest amount of pain to the patient, the least risk of subsequent trouble, and in the most expeditious manner possible. Among the agents employed are cocain, arsenous oxid (As_2O_3), the application of ice-cold water or a general anesthetic, such as gas, ethyl chlorid, or ether. While cocain finds an increasing number of advocates, and is to be preferred where it can be employed successfully, there are many cases in which a considerable amount of cutting is necessary in order to obtain sufficient access to the pulp to permit of its exposure, and this operation could not be accomplished painlessly. In the majority of such cases arsenic will be found to achieve the desired result either painlessly or with very little discomfort, provided always that there has been no recent congestion of the pulp or no acute inflammatory condition present at the time; such conditions, indeed, prove a barrier to the successful action of both cocain and arsenic. The means whereby arsenic may best be applied to the pulp are too well known to call for detailed description, but it may be pointed out that the quantity should be small, and the desired result should be obtained in from two to four days if the pulp is exposed. But devitalization may be accomplished without preliminary exposure, though a longer time is usually required to obtain complete devitalization in this way. An excellent method is to apply a small quantity of arsenic for from twenty-four to forty-eight hours—this is generally long enough to desensitize the dentin sufficiently to enable an exposure of the pulp to be made painlessly, when it may be anesthetized with cocain in the usual manner by pressure; but care must always be observed not to employ pressure anesthesia where there is reason to believe that the pulp is septic, otherwise there is danger of infecting the apical space and so setting up pericementitis. High pressure anesthesia may also be successfully employed even in a tooth in which there is no cavity.

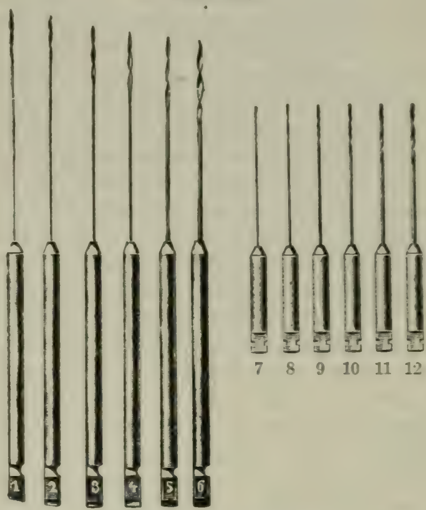
Acutely inflamed pulps. These can seldom be painlessly destroyed by means of the agents spoken of, and the methods commonly employed of applying soothing dressings such as oil of cloves, carbolic acid, etc., frequently fail to accomplish the desired result of relieving the acute pain in a reasonably short time. Relief must be had for such cases, and quickly. To accomplish this the writer has found the following plan to be most successful; it is based on the application of cold water. Take a couple of 2-oz. slip-joint syringes, and fill one with water of about 70° F., or sufficiently cold to cause only slight discomfort; fill the other with water of about ten degrees lower than the first. Place the saliva-ejector in the mouth, and with the first syringe direct the stream of water on to the crown of the tooth and into the cavity if there be one, using about half the syringeful. Quickly change it for the second syringe, and while this is being used the assistant should fill syringe No. 1 with cold water at about 50° F. This is used immediately after the previous one, and while this is being done have syringe No. 2 filled with ice-cold water and proceed as before. Usually this is sufficient to allow the operation to be proceeded with, but if not, a second syringeful will so anesthetize the tooth that by means of a large bur run at high speed, or with a sharp excavator, the pulp may be cut into quite painlessly or with very slight pain indeed. While this is being done the assistant is to keep up a steady stream of ice-water on to the tooth and bur, or ethyl chlorid spray may be used. Where sufficient accessibility can be obtained it is preferable to follow on with the latter instead of continuing with the cold water, as more pronounced anesthesia may thereby be obtained. The ice-cold water is, however, sufficient, and moreover is, generally speaking, more manageable. The secret of success in this is in the gradual and continuous application of the cold water. Once free hemorrhage has taken place, relief is instantaneous and generally complete. Indeed it is most marked in those intractable cases in which there has been no exposure, or where it has been so minute that no expansion of the pulp into the cavity has been possible, and in consequence of which there has been ex-

treme pressure resulting in marked pericementitis. Relief having been obtained in this way, a dressing of oil of cloves, or suchlike soothing application, should be sealed into the cavity and allowed to remain for twenty-four hours or longer, when the pulp will usually be found to yield readily to cocain or arsenic, if in the meantime it has not died.

There are, however, a fair number of cases of congested pulps of a passive or even semi-acute type which seldom merge into the acute form even when their devitalization is sought by means of As_2O_3. These may die without any pain, in which case they may be treated in the ordinary way. It sometimes happens that twenty-four hours or two or three days after arsenic has been applied to a tooth in which there has been no exposure of the pulp the tooth exhibits extreme sensitiveness to thermal changes, and mostly to heat—indeed, cold generally relieves the paroxysms of pain, which are usually of an intermittent character—and these symptoms, if no endeavor be made to treat them, will continue for days. Relief in such cases can be had at once by cutting down and exposing the pulp, and this may be done without causing pain, as the dentin will be found insensitive though the pulp be alive. Such cases may be dressed for a day or two, when the pulp will either have died or its devitalization may be painlessly accomplished by a second application, of either arsenic or cocain.

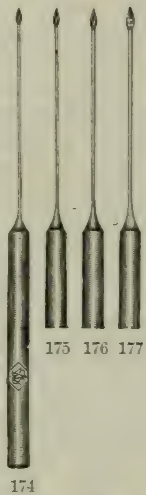
It is a good plan, indeed, always to open in the above manner into the pulp of a tooth which has exhibited symptoms of hyperesthesia after As_2O_3 has been applied for twenty-four hours or longer. General anesthesia by means of nitrous oxid is an efficient and ready means whereby the operation of pulp extirpation may be made easy of accomplishment, provided free access can be obtained to the canals. The gas or gas and oxygen may be given in the usual way, and when the patient is anesthetized, or nearly so, the administration may be continued by means of the nose-piece and so maintained with ease for any reasonable length of time—from ten to fifteen minutes even—or gas may be combined with ethyl chlorid.*

FIG. 45.



Beutelrock drills.

FIG. 46.



Gates-Glidden drills.

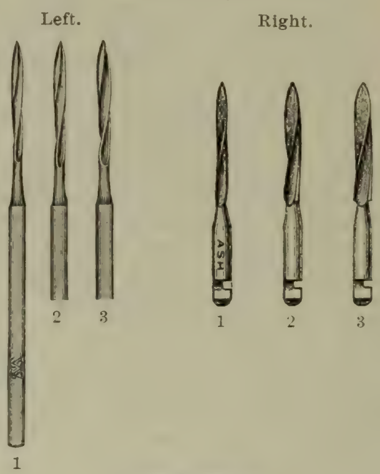
Removal of the pulp. Assuming that the pulp has been anesthetized, or its

* This method has generally advantages over all others where the services of a specialist (anesthetist) are available, as the operator is free to devote his whole attention to the removal of the pulp.

vitality destroyed, the next step is to remove it entirely. A fair proportion of pulps present obstacles to their complete removal, and these are more pronounced with multi-rooted teeth than single ones. In the majority of single-rooted teeth the removal of the pulp may generally be accomplished with little difficulty, while it is frequently impossible to remove the pulp of multi-rooted teeth owing to the small and tortuous character of the canals, as well as the presence of pulp-stones, particularly in the third molars, the buccal canals of upper and the anterior canals of lower molars. To facilitate this part of the operation it is well to cut freely and so expose the whole floor of the pulp chamber. Such canals as are too constricted to admit of the removal of the pulp by means of the smallest size of pulp extractors and cleansers should be enlarged by means of suitable drills and broaches. For this purpose Beutelrock's (Fig. 45) and Gates-Glidden (Fig. 46) nerve canal drills—the former in six sizes, Nos. 7–12 for right-angle and Nos. 1–6 for straight handpiece—are among the most useful forms. After the removal of the whole of the pulp from the canal, which may be accomplished in the majority of cases in the manner suggested if sufficient time and care are taken, such canals as do not require to be utilized for the purpose of supplying anchorage for a crown or bridge may be filled at once by means of either chloro-percha and gutta-percha points, zinc chlorid cement, or other permanent root-filling material. Or the canals may be dressed, and filled at a subsequent sitting. When there is reason to believe that a canal may require to be utilized later for the purpose of inserting a post or dowel to carry a crown or bridge, it is a good plan to use a gold or other metal post instead of gutta-percha points to fill the canal, and this should be smooth, not roughened, and allowed to project into the cavity of the tooth, while if necessity arose it could easily be removed.

Where it is found impossible, owing to abnormal conditions, to remove the whole of the pulp, the canal should be filled with a paste composed of zinc oxid and oil of cloves, to which should be added hydronaphthol or other suitable permanent antiseptic. Canals which require a post or dowel for the attachment of a crown or for anchorage of a bridge or like appliance, should have their canals enlarged to near the apex with suitable drills and reamers, and for this purpose the drills already mentioned may be used, followed by Peeso's reamer, sizes Nos. 1–3 (Fig. 47). The writer has been in the habit of using a Peeso reamer a size smaller than No. 1, and has found that it

Fig. 47.



Peeso reamers.

bridges over a gap between the largest size of Beutelrock or Gates-Glidden drill and the No. 1 Peeso reamer, which sometimes appears too great. This smaller size will be found particularly useful for opening up the canals of lower incisors and canines. Other sets of instruments will doubtless be found equally effective; the selection of these is a matter of individual preference.

During the process of enlarging the canal for the reception of the post, great care should be exercised to employ the various drills and reamers in the order of their progressive sizes, and to note carefully the direction and length of the canal. This will be facilitated by the frequent use of a gage for ascertaining its length, and a suitable one for the purpose may be formed

of a probe furnished with a small perforated rubber disk (Fig. 48).

During the process of enlarging the canal it should be kept flooded with eucalyptus oil, which acts as a lubricant and facilitates cutting; and while at the same time it keeps the instrument cool, it affords the advantage of the work being done under perfect antiseptic conditions.

While the opening up and enlargement of the root-canals can be satisfactorily accomplished by means of hand instruments only, and doubtless with greater safety, the employment of the dental engine greatly facilitates and expedites the work. At the same time the delicacy of touch which is associated with the use of hand instruments is to some extent sacrificed, and the danger of perforation increased, but this is slight if reasonable care and skill have been used. There is, however, always the danger of accidentally breaking an instrument in the canal —a much more serious matter in the case of a lower than an upper tooth, as gravity favors the removal of the broken piece from the latter. Cases are rare indeed in which the broken piece cannot be removed by the exercise of patience and skill, and there are several instruments designed with the special object of dealing with such cases. At the same time it is better to anticipate the possibilities of an accident of this kind and to be in a position to deal with it in the most effective manner should it occur, and so the drill or reamer should be carried a short distance each time and then withdrawn. This should be repeated until the canal is thoroughly opened up nearly to the apex, when it should be sealed.

Fig. 48.

Smooth bristle with rubber disk for measuring canals.

Sealing the Apical Foramen.

This can be most satisfactorily and easily done after the canal has been opened up to the full extent necessary for the adjustment of the post; and where the root has been a pulpless one to begin with it is often best to defer the operation of sealing until the crown or bridge is completed and ready for final setting, and the operator has fully satisfied himself that the canal is aseptic.

With regard to roots which have been filled at a previous operation, it is of importance to ascertain that their hygienic condition is sound, and if on careful examination a doubt should arise with regard to this they should be once more treated and brought into a thoroughly satisfactory state. The importance of this is manifest when it is remembered that the permanence of the work is dependent upon the maintenance of an aseptic condition. From time to time a great many different materials have been used for this purpose, but zinc oxychlorid cement and gutta-percha are those which now find most favor, and either of them gives entirely satisfactory results when properly used. The method employed with regard to zinc oxychlorid is as follows: Thoroughly clear the canal of all traces of débris and wipe it out with alcohol, followed by cotton and the

root-drier. Then flood it with oil of cloves, once more wipe it out with cotton, and finally dry thoroughly with the root-drier, which should be used until there are indications of beginning discomfort. The use of the hot-air syringe alone is not sufficient, as the upper part of the canal cannot be thoroughly dried by this means. The zinc oxychlorid should now be mixed thin and carried to the end of the canal by means of a broach or other suitable instrument around which a little cotton has been wound, and the cement gently pumped into place, care being taken not to force any of it through the foramen. The broach should be carefully withdrawn and a suitable small blunt-pointed canal plugger employed to compress the cement while it is still quite soft, so as to eliminate the chance of the production of any minute air-bubbles which might result from the suction action caused by the withdrawal of the broach; or a small quantity of the cement sufficiently firm to be held on the end of a blunt-ended canal plugger should be carried directly to the apex and gently tapped into place. With regard to sealing with gutta-percha, the preliminary steps to be followed are the same as those described for zinc oxychlorid, except that the canal should be lightly wiped out with eucalyptus oil on cotton. A suitably shaped small cone of gutta-percha, which should first be dipped in eucalyptus oil and the surplus oil shaken off, is then carried by means of a blunt-pointed plugger to the end of the canal and forced gently but firmly into place; or chloro-percha may be used instead of eucalyptus.

The foregoing observations with reference to the means employed for obtaining access to the root-canals of those teeth which have called for devitalization are applicable also to those numerous cases in which the pulp has died previous to any opportunity having been offered for treatment. These are generally septic and may be the seat of acute or chronic pericementitis and the subject of alveolar abscess, with or without a fistulous opening. The causes which give rise to these conditions are various and need not be dealt with at length, but the active cause is, of course, the invasion of micro-organisms. The symptoms may be non-existent, but there is usually discoloration, with or without subacute or acute pericementitis. The treatment consists of first applying the rubber dam, if possible, opening freely into the pulp chamber as far as practicable in a direct line with the axis of the tooth, so as to obtain access to the canals. In single-rooted teeth this is usually easy of accomplishment, while in the molar region access to canals, as already stated, is often very difficult; it may be facilitated by the use of 25 to 50 per cent. solution of sulfuric acid conveyed to the canal by means of a platinum point. The walls being thus softened, the action of the acid may be limited by the application of a solution of sodium bicarbonate; or access to the canals may be obtained by the use of Ward's sodium and potassium preparation.* Care must be taken, where no pericemental trouble exists, to avoid setting this up by a too vigorous instrumentation. After the canals have been opened up as thoroughly as prudence dictates, they should be dressed with tricresol or one of the essential oils; for this purpose there is none better than oil of cinnamon or oil of cloves; the former, however, should not be used for the front teeth or bicuspids, owing to its tendency to turn the teeth yellow.

Where a blind abscess is situated at the end of a root, it will often yield to the treatment thus described, but it will be unsafe to seal the apices of such canals until all trace of sepsis has gone, or the case has shown itself one of those in which more vigorous measures must be adopted. These will generally be found to resist treatment owing to a necrotic condition of the tissues about the apex of the root, and can usually be brought into a healthy condition by cutting down on to the end of the root through the gum. This may be done almost painlessly in some cases by freezing with ethyl chlorid (the injection of cocain being

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* The opening up and cleansing may be greatly facilitated by the use of Donaldson's pulp cleansers, which indeed will be found invaluable.

contra-indicated owing to the danger of extending the area of septic infection); a much better plan, however, is to employ a general anesthetic, gas being the safest and most reliable. After cutting and scraping away all the necrosed tissue, and, if need be, amputating a portion of the end of the root, the canal of which should have been previously filled to the apex with zinc oxychlorid or chloro-percha, the wound may be packed with antiseptic gauze, renewed daily until it has healed up, when crowning may be proceeded with.

If a fistulous opening exists in connection with the abscess the opportunity may be taken, after the canal has been thoroughly opened up and treated as already described, to pump through the canal and fistulous opening a mixture of equal parts of carbolic acid and tincture of iodin until it appears on the gum, and continue dressing the canal until it is aseptic.

The Use of Tube Posts.*

Where time does not permit of thorough root treatment before crowning, the author has found the plan which he advocated many years ago, and described in the Dental Cosmos for September 1901, to be highly satisfactory. This consists of the application of a tube post instead of a solid one. These tube posts are often of great advantage in economizing time and allowing the operator to proceed with the more permanent structural part of this work while the tiresome routine of root treatment is in progress. When a root which is the seat of chronic abscess has to be crowned or utilized as a bridge abutment and does not yield to treatment within a reasonable time, there is much to be said for subjecting it to a period of probation before finally and permanently sealing its apex. If such a probationary period be deemed necessary, obviously the patient must remain without the appliance (crown or bridge) until the operator considers that he may safely proceed with its construction. To many patients such delay is irksome, and it is particularly trying to those who reside at a distance and who must have the required work done within a limited time owing to social or business calls, but who at a subsequent date could spare time for thorough treatment. From their point of view, as well as from that of the dentist, any plan which will shorten treatment is of importance, therefore in such cases the employment of tube posts will be found an excellent time-saver.*

Tube posts are used in all respects exactly like solid posts. Two points should, however, be carefully noted: First, that the joint of the tube should be soldered along its *whole* length, as the maximum amount of strength and rigidity is thereby obtained. Second, that before soldering the tube post to the cap the lumen of the tube should be filled with some substance which will prevent it from being soldered up in the subsequent step of crown or bridge construction. For this purpose some fibers of cotton or a splinter of wood dipped in asbestos and plaster paste or chalk-and-water may be placed into the tube; either is equally good and is easily washed out afterward, leaving the interior of the tube clear. The strength of these tubes is, for all practical purposes, equal to that of solid pins, and they permit of the continuance of root treatment after the crown or bridge has been set in the mouth, either permanently or temporarily as seems best to the operator. To permit of the canal being dressed so as to make it aseptic while a temporary crown or bridge is in place, the tube post, which should not in such cases fit tightly, may have a few fibers of cotton wound around it and be dipped into cinnamon oil or other suitable antiseptic before forcing it into place. The dressing may be supplemented by one in the tube. Moreover, the tube post should have three or four tiny holes drilled through it—and these will not appreciably weaken it, but permit the dressing to soak through into the root. When any extra strain has to be borne

* From "Pot-Pourri of Practical Hints," (No. II), by the author. Dental Cosmos, September 1901, page 984, etc.

* See Chapter III.

the tube post may be reinforced at the coronal end by soldering a very thin section of tube, about one-eighth of an inch long, to the outside of the tube post.

To prevent the apex of the canals being accidentally sealed by cement or gutta-percha, a small pellet of cotton dipped in an essential oil may be placed at the apical end of the canal and the interior of the tube post similarly lubricated; or several strands of waxed silk may be drawn through the tube and the ends allowed to project slightly at the apical and sufficiently at the proximal end to permit of its withdrawal when the crown or bridge is cemented to place. Any excess of cement or gutta-percha can thus be readily withdrawn, while it is still soft, by means of a roughened broach or bristle, the tube finally cleared of all fragments, and the apex left open by the removal, through the tube, of the cotton pellet. When the root has been dressed to a healthy condition the foramen is to be sealed and the root filled in the ordinary way.

From the above it will be evident that the principle of root intubation in crown and bridge work brings within immediate and complete treatment (as far as the mechanical part of the work is concerned) certain cases which formerly could not be dealt with, much less finished, except under the most favorable condition of professional attendance. Sometimes badly abscessed front roots have to be made immediately presentable when to seal in a dressing for any length of time, much less put on a crown, would be dangerous, and where the patient may not be able to give for days and weeks the time necessary for thorough root treatment, and yet has to have a crown or bridge put on. Further, when out of reach of professional help a patient may be able to remove a dressing from a root which threatens to give trouble or continue the re-dressing of a root after receiving some elementary instructions and being supplied with the necessary instruments.

In the crowning of roots whose apical foramina have been enlarged either from persistent abscess or some other cause, these posts have a markedly successful application. The trouble here is obviously the sealing of the apex, and this is rendered much easier when a tube post is employed. With the use of a solid post it is impracticable to fix a crown before the apex has been sealed, without risk of pushing the cementing body or air through the apical foramen, but by the use of a tube post this may safely be done in the following manner: Take a tube of suitable size and taper the end to fit the upper third of the canal so that it will go to the apex. The crown or bridge may then be completed and fixed to place in the manner hereafter to be described.

From the foregoing it will be seen, therefore, that tube posts afford a ready means of postponing treatment until a favorable opportunity arises, while they do not necessarily prevent the mechanical part of the work being completed. Other advantages of their use will be apparent, such as their employment in cases where accumulation of gases demands some vent.

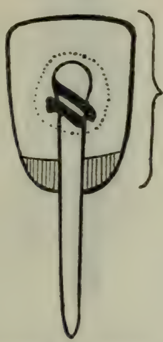
Other uses of the tube post will be subsequently dealt with.

Hypertrophy of the Gum.

Among the obstacles often encountered in the preparation of roots for crowning, hypertrophy of the gum takes a leading place, and treatment, as a preliminary step to root trimming and shaping, is often essential. Not infrequently such hypertrophy of the gum is accompanied by that of the pulp also; fortunately, when that occurs the pulp will be found comparatively insensitive; at all events it is rarely responsive to thermal impressions unless these are extreme. The worst cases to deal with are those in which the roots are almost entirely hidden from view by excessive growth of gum, the removal of which as already stated must be accomplished before root trimming can be proceeded with. There are various methods by which this may be done, the selection of the most suitable one being generally dependent upon the local conditions met with. Thorough freezing by ethyl chlorid answers admir-

ably and results in the smallest amount of hemorrhage, and in consequence the least interference with the field of view. The adjacent living teeth should be protected, and to accomplish this a celluloid matrix may be applied and filled with wax, or a piece of thin sheet wax may be molded over them. *The gum should then be thoroughly frozen,* when a large spoon excavator may be used to cut away the excess of gum, and if need be, of pulp; or complete anesthesia may be obtained by the injection of cocain. Where the hypertrophied gum is not excessive, or too adherent to the root margin, free

Fig. 49.



Dotted line indicates soft solder covering end of wire and pins of tooth.

exposure of the root may be accomplished by compression of the tissues by means of temporary gutta-percha, the retention of which in place is made more secure by the insertion of a headed post of wood, the narrow end of which may be forced into the canal and then the gutta-percha packed around it and under the free margin of the gum, and also against the adjacent teeth. Frequently, however, the best plan is to employ a temporary crown (Fig. 49) for the purpose, and in the case of one of the upper front teeth this often becomes a practical necessity if temporary disfigurement is to be avoided. For this purpose a stock of temporary crowns should always be on hand either with tubes or solid posts, and these crowns may be either plain or tube teeth. As accuracy of fit is not necessary, the selection of such temporary crowns need not be large.

The foregoing condition is often associated with extensive decay; so extensive, indeed, that it may preclude the possibility of accurately fitting a band to the root, without recourse to preliminary building up to or above the level of the gum. Usually this is best carried out with amalgam combined with cement—the latter, of course, being covered with the amalgam. The method of anchorage will depend upon the conditions present and the nature of the crown to be used. In the case of one of the upper incisors

Fig. 50.

Tube fitted into wide canal and filled around with amalgam. Post is fitted into tube.

or canines, anchorage may be readily obtained by means of a tube cemented into the root (Fig. 50), and if the root is hollowed out by decay this is rendered all the easier.

Root Perforation.*

Among many difficulties met with in the preparation of roots for crowning, perforation is one of the most troublesome we are called upon to deal with, and previous to the use of copper amalgam successful treatment was rarely looked for; and when the methods suggested consisted of covering the perforation with gutta-percha or fitting a piece of quill or metal over it, it is not surprising that success was seldom obtained. Indeed, where a post was used, it is diffi-

* From a paper by the author, in the *International Dental Journal*, June 1897, entitled "Root Perforation: A New Method of Treatment."

cult to see how success was ever attained at all. The case was different, however, when a crown was employed which did not necessitate the use of such anchorage.

Before describing the methods of employing copper amalgam it might be well to mention the varieties of perforations met with, and these may be roughly divided according to their causes into two classes—(1) *Traumatic,* accidental in root drilling. (2) *Carious,* as the result of caries.

The traumatic variety is usually deep in the root and small in area, and is the more amenable to treatment if undertaken soon enough to prevent intrusion of the pericementum into the canal or cavity.

The second variety generally occurs about the cervix, and is often very extensive. When perforation of either kind occurs, it is followed, as indicated above, by intrusion of the soft tissues subjacent and by more or less continuous pain; the intruding soft mass becomes irritated by the sharp edges of the aperture till it becomes inflamed and gangrenous, sloughs, or gives rise to abscess.

The preliminary treatment for this condition, whatever the position or extent of the perforation may be, should be conducted with a view to displacing the soft tissues from the canal, and this can best be effected by packing it tightly with cotton dipped in oil of cloves or eucalyptus, or suchlike antiseptic dressing, and sealed with gutta-percha. The dressing, if need be, may be repeated at intervals until this is accomplished. When the parts are brought into healthy condition the apical portion of the canal may be filled, if this has not been previously done, and attention may then be directed to the perforation. It is here that the advantages of copper amalgam over any other material are made evident, as owing to its plasticity it can be readily and easily adapted to the tissues underlying the lesion without danger of displacing them; besides, it is non-irritant, insoluble, antiseptic, and becomes hard and resistant within a reasonable time, and capable of bearing considerable pressure without being readily displaced.

If the canal is not already sufficiently large, it should be further reamed out, care being taken not to encroach upon the perforation, and the enlargement should be increased at the proximal end of the root, with the object of obtaining as good a view of the perforation as possible without unduly weakening the root. The apex having been filled, a small quantity of thin copper amalgam should be carried to the end of it, and a tapered steel instrument gently pushed through the soft amalgam till it reaches the sealing material. This should be worked

FIG. 51.

Steel pin in canal with copper amalgam around about and filling false canal to perforation in side of root.

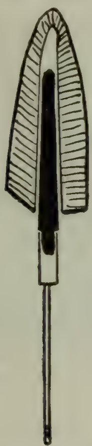
with an even rotary motion, so as to spread the copper amalgam evenly around the interior of the canal, when it can be withdrawn, and a steel or German-silver dowel, slightly coated with wax and sufficiently long to project a little way from the canal, should be carried to the apex, and then copper amalgam gently tamped around between the dowel and the walls of the canal, so as to fill it up completely, care being taken not to use sufficient pressure to push the copper amalgam beyond the perforation (Fig. 51). The case may now be left from twenty-four to forty-eight hours, to allow the copper amalgam to become thoroughly hard, when the temporary dowel may be easily withdrawn after slight heating by means of a hot instrument applied to it.

Should nothing more than slight dis-

comfort follow—and there ought to be none if the foregoing instructions have been followed intelligently—then crowning or bridging may be proceeded with, reasonable care being taken to handle carefully so as to avoid displacing the amalgam.

Another class of case which is also difficult to deal with is that of fractured roots, and the treatment of these is often very puzzling. If the fracture is a bad one it may be necessary to remove the root, but unless the fracture is extensive and considerable time has elapsed before

FIG. 52.



Trephine cutting edges from Logan pin.

it has received attention the conditions will usually yield to treatment—the particular method of which will depend on whether the whole or only part of the fractured root has to be retained. Assuming that the whole may be retained, then the parts should be drawn close together by means of a strong wire twisted tightly around them. A strong band and cap may then be fitted, and the crown completed as far as practicable in the usual way. In such cases the crown should always be cemented on. Results are, however, uncertain.

There is yet another class of case which may be dealt with at this juncture, namely, the fracture of a post in a root. This accident is one which we are called upon to face from time to time; and while the simple cases are easy to deal with, there are some which are very complex. They naturally group themselves under two headings, viz, (*a*) those in which the broken pin *can* be removed; (*b*) those in which the broken pin *cannot* be removed. The usual method of dealing with the first variety is to drill away the surrounding tissue until the end of the post is so well defined that it can be grasped with a pair of fine-pointed pliers and by gentle but firm rotation and traction extracted; or one of the forms of post-extractor may be employed, and if the post can be grasped there should be little difficulty in removing it. The fracture may, however, have occurred so far up as to render it impossible to grasp the broken end, and this accident may happen to a feeble root as well as to a strong one. In the case of the former, even the smallest amount of vigorous handling might end in such a disaster as fracture, permanent loosening, or even the extraction of the entire root itself, and if these eventualities are to be avoided, removal of the fractured post ought not to be attempted. The risks attending the attempted removal of broken posts or dowels as above described are generally confined to those cases where they have been fixed into the canal with

FIG. 53.

Method of crowning with broken post in canal. Tube over broken part; new post in tube. Tube is soldered to cap and band.

cement. If they have been simply fixed with gutta-percha their removal can usually be effected without difficulty by thoroughly heating the remains of the post by means of a blunt-ended root-drier, and so softening the gutta-percha, when a fine instrument inserted between the post and walls of the canal may dislodge the broken fragment. Failing that, a bur or trephine may be used to enable sufficient material to be removed so that a catch or hold is had for the instrument, when its withdrawal should be easy. When it has been found impossible to remove the remains of the post the case may be effectually dealt with in the following manner: If the post is other than a round one—for instance, similar in form to the Logan—use a trephine the inside diameter of which is slightly smaller than the cross section of the crown end of the post (Fig. 52), and this will serve to round off the corners and so prevent the necessity for using too large a trephine, which might result in undue weakening of the walls or even perforating them. Continue to trephine as far as possible, consistent with the avoidance of the danger indicated; that will in most cases be at least one-eighth of an inch, and this will be found to afford ample anchorage if the following plan is carried out: The end of the fractured pin is rounded, and into the groove made by the trephine a tube of dental alloy or gold is fitted and soldered to the cap and the surplus cut off flush with its surface. A post is then fitted into the tube to carry the crown, which may now be fitted in the ordinary way. This device gives the most secure grip with a minimum sacrifice of tissue, and it will be noted that such a tube, band, and cap really afford a triple grip: First, the tube grasps the broken pin; secondly, the tube is held externally by the surrounding dentin, and thirdly, the circumferential band secures both (Fig. 53). It will be obvious that such a tube is vastly better than a solid post of equal length, the latter being held *only* externally, and tight encircling of the broken post by the tube renders it once more equal to a solid one.

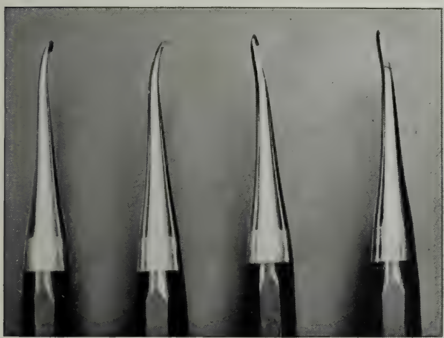
CHAPTER VI.—Mechanical Preparation and Shaping of a Root for the Reception of the Crown.

In the preparation of teeth or roots for crowning and bridging, thorough familiarity with the shape of these, and particularly with their cervical surfaces, is indispensable to success in so shaping them that bands and caps may fit with absolute accuracy. But such knowledge alone would be but a poor guide unless accompanied by a cultivated sense of touch and sound, as by this means only can one tell that the enamel has been completely removed. This double sense can only be obtained by practical experience and varies much in individual cases. Before proceeding, then, to a description of the methods employed, it will be well at the outset to make it clear that while descriptive methods are doubtless of value, they can only suggest lines of procedure, as individual methods yielding similar results show wide divergence; consequently no particular method can be given preference. So far, our consideration of the treatment and preparation of teeth and roots has been that commonly followed in dealing with devitalized teeth for the purpose of filling or inlaying, with the exception of such special circumstances as were spoken of with regard to the use of tube posts when therapeutic measures could not be completed. But we have now to consider the mechanical preparation of teeth and roots for crowning, and as this is the most important part of the work and as no amount of skill afterward expended upon the constructional parts can possibly make up for careless or unskilful root preparation, it is of the utmost importance that each step in the operation of root-shaping should be carried out in the most perfect manner possible, entirely irrespective of the amount of time and labor which it may involve. The various steps seem easy enough, but this is by no means the case with all of them, and the dentist who approaches this part of the operation under the impression that it is not of prime importance is bound to repent of his over-confidence

or carelessness. It is safe to affirm that there are more failures in crown and bridge work due to imperfect shaping of roots than to any other cause. If a proper appreciation of this fact were more general, less would be heard of the failure of crown and bridge work to meet the requirements of mechanical and hygienic efficiency.

At this point it may be well to mention some of the instruments and appliances which will be found useful in the work; and as it has been seen that like results may be reached by various methods, it follows that the selection of instruments and appliances will depend largely upon individual choice. In any case an extensive assortment of wheels, disks, and points should always be available.

FIG. 54.

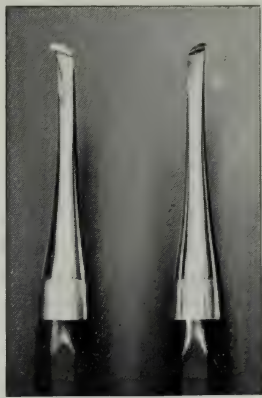


J. O. Wells' enamel cleavers.

With regard to hand instruments the following will be found useful for removing the enamel after the tooth or root has been ground down, which should be done to about one-sixteenth of an inch of the gum margin for all forms of tube crowns: J. O. Wells and C. S. Case's enamel cleavers (Figs. 54 and 55). The former, being smaller in the head, are preferable, as they can be more readily introduced between the free margin of the gum and root. Also scalers (Fig. 56—S. S. W.). All of these instruments should have short heavy handles, which will afford a sure grip and should be held so that the danger of slipping and wounding adjacent parts may be avoided.

Crowns may be described under two main divisions—namely, banded and unbanded. The banded crown calls for the greater skill in root trimming, necessitating as it does the removal of the whole of the enamel from the periphery of the root, and the methods whereby this may be satisfactorily accomplished will now be dealt with.

FIG. 55.



C. S. Case's enamel cleavers.

All roots which require banding must be so trimmed that their sides are parallel or slightly convergent, and whether the gum has receded beyond the edge of the enamel or not. For the purpose of describing in a general way the method of preparing a root for banding, one of the upper centrals may be selected. What remains of the crown should be

FIG. 56.

S. S. White scalers Nos. 3 and 7.

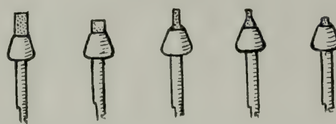
removed to within about one-sixteenth of an inch of the gum. For this purpose cross-cut fissure burs are generally best, the use of excising forceps being seldom if ever necessary, and always objectionable. Care should be taken to follow with the bur the festoon of the gum without injuring it. Having removed the remains of the crown, the next step is to smooth off the surface of the root with a carborundum wheel. The ring of enamel

Fig. 57.

Shows method of using enamel cleaver.

must now be removed from the end of the root, in the following manner. A beginning should be made at the center of the labial surface, and, a suitable instrument (see Fig. 57) being chosen, it should be introduced under the free margin of the gum, the cutting edge being held close against the surface of the root, when it should be gently pushed up until the edge slips over the ring of enamel. Then, keeping the cutting edge firmly pressed against the surface of the root, a downward pressure is applied, the instrument at the same time being *slightly* rotated. On repeating these movements several times, the enamel will be found to leave the root in the form of a fine powder. This manipulation is continued until all is removed. Generally speaking, its removal in the manner described is fairly easy, particularly so when it has been disintegrated by decay or where the pulp has been dead for some time. Occasionally, however, the whole or part of the enamel may be more easily and quickly removed from the basal ridge, where it is thicker and more adherent, by means of small stones. These, however, unless used with skill and care, are more liable to injure the gum and so increase the chances of recession. But this danger may be minimized or altogether removed, except in

Fig. 58.



Different shapes of Butler's point.

cases where the gum is in a hyperemic condition, by the use of suitably shaped Butler's carborundum points, mounted on porte-polishers and used with the contra-angle or straight handpiece, the former preferably.

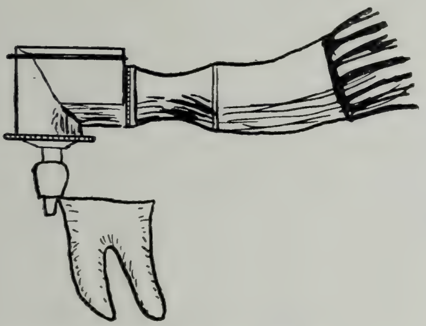
Fig. 58 shows some of the most useful forms, and these may be quickly brought to the required shape by means of an old file held against the carborundum point while it is being rapidly rotated in the handpiece, or by means of one of the diamond-pointed wheel-truers for the purpose. It is astonishing how extremely fine and small these points may be made, while retaining sufficient strength for efficient grinding. The extreme point may be tipped with shellac to prevent it from injuring the gum, and this method is also applicable to small stones. The points should be short enough to allow the shoulder of the porte-polisher to rest on the margin of the root (Fig. 59) and so act as a stop in preventing the

point from passing too far below the gum.

The methods employed in the preparation of the upper bicuspids do not differ materially from those followed in the case of the front teeth, but in the preparation of the upper molars the difficulties are considerably increased. Here the use of stones will be found necessary.

Proceed first to grind down the tooth to within one-sixteenth of an inch or less of the gum, then using enamel cleavers and small carborundum points in the contra-angle or straight handpiece, remove the whole of the enamel in the same way

Fig. 59.



Showing method of using Butler's point.

as described in trimming incisor roots; as already stated, this will be found a more difficult proceeding, as the enamel is thicker and often extends a considerable way under the gum, and when quite sound offers considerable resistance to its removal. Here short Butler's points and the various forms of abrasive disks will be found useful.

With regard to the lower front teeth, no special difficulties are met with owing to their accessibility. The bicuspids and molars, however, particularly the latter, give greater trouble than any other teeth, with regard to trimming their mesiobuccal and mesio-lingual corners; and again this may be best accomplished by the use of small Butler's points and safe-sided disks, also one of the J. O. Wells enamel cleavers already spoken of. This latter is best used in the following manner for the left side: Grasp the handle as one would that of an elevator, and, with the side of the ball of the thumb resting on the edge of the lower incisors, or other convenient point, use the instrument as a lever of the first order, the fulcrum being the thumb. By keeping the wrist rigid and depressing the elbow for each movement, great leverage may be obtained (Fig. 60), while for the

Fig. 60.

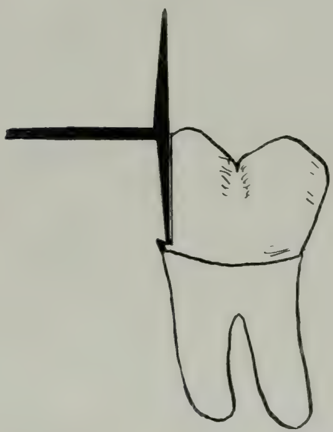
Shows method of using enamel cleaver on left side of lower jaw.

right side the necessary trimming may be carried out by means of wheels and points.

The foregoing description is that adopted for trimming a root where the application of a tube crown is decided upon. But as all-gold crowns in conjunction with tubes are sometimes used as abutments, a short description of the means whereby these can be shaped may be useful. The first step, then, is to grind off enough of the tooth to allow of sufficient room for the gold cusps. Following this the walls may

be given the necessary form by means of the various disks and wheels already spoken of. In the use of these, great care must be taken to grasp the handpiece firmly and to keep the disk or wheel thoroughly wet—as, by doing so, not only will cutting be done more speedily, but the chances of the disk either breaking, sticking fast, or jumping and wounding the gum or cheek, are avoided. If, however, too much is removed in cutting off these contours, a ledge may be formed (Fig. 61), either above or below

FIG. 61.



Showing accidental formation of a ledge in trimming tooth.

the margin of the gum, which will present a serious obstacle to the accurate fitting of the band, by acting as a step on which the band will rest and so prevent it from being forced into place. In the event of such an accident happening before the cut reaches the level of the gum no harm will follow, and the necessary shaping can be recommenced at the peripheral margin. On the other hand, if the cut has been taken to below the level of the gum line, it may be continued till it has reached the level of the lower border of the enamel, and the band allowed to rest on it, provided always that there is no ledge left outside the band (Fig. 62), in which case the latter must be thickened at this point to bring it flush with the margin of the tooth ledge.

In order to prevent any such difficulty it is best to grind from the margin rather than make vertical cuts, using for the purpose small inverted cone and cup-shaped wheels. Such broad wheels present a greater cutting surface than the edge of a thin disk; also various forms of Butler's points in the contra-angle handpiece may be supplemented by coarse emery paper and cloth disks.

From time to time, during the process of trimming and shaping, careful exploration should be made with probes to

FIG. 62.

Showing band resting on ledge.

detect overhanging margins, while care should be observed throughout to obtain a proper degree of taper to the root.

The foregoing description has had reference to teeth in their normal position, but certain variations are met with which call for special treatment; to this class belong teeth whose approximal surfaces have been invaded by caries and in part destroyed; in consequence the adjacent teeth generally approximate, and so leave insufficient space for a properly contoured crown. To overcome this difficulty one or other of the following methods must be adopted: Separate the adjoining teeth by packing gutta-percha into the space and hard against the adjoining teeth, renewing this at intervals till sufficient space is obtained; or accomplish the purpose by some mechanical device; or else by grinding the approximal surfaces of the adjoining teeth suffi-

ciently to permit of a crown being fitted; or by making the most of the available space by fitting a crown with the maximum contour which the space will allow.

Another abnormality commonly met with is that of a molar or bicuspid lying at an angle toward a space from which one or more teeth have been removed. Such cases are usually dealt with easily and satisfactorily when a single crown only is required, but when the teeth on either side of the space converge and the space has to be spanned by a bridge the problem is not always so simple, though by no means so difficult as represented. This and other abnormalities will, however, be dealt with later, and methods described whereby they may be simply and satisfactorily overcome.

(To be continued.)

THE DIAGNOSIS OF MALOCCLUSION OF THE TEETH.

By SHELDON FRIEL, B.A., M.Dent.Sc.(Dubl.)

(Read before the Alumni Society of the Angle School of Orthodontia, New London, Conn., July 1913.)

THE correct diagnosis of malformations of the jaws is of such vast importance that any effort that may lead to more accurate methods should be most welcome.

It is essential that for use in the diagnosis of malformations so complicated as those found in the teeth and jaws there should be a standard classification, complete yet simple, and terms with accurately defined meanings.

Such a classification and such terms were many years ago introduced by Dr. Angle. His classification is accurate and scientific, but it must be remembered that it is a classification primarily based on the relation of the jaws.

MEANS FOR ORTHODONTIC DIAGNOSIS.

In the latter part of my paper I shall speak further of this matter, but I wish to devote its greater portion to a study of the methods employed in forming a diagnosis, and to a suggested modification of one of these methods. The teeth have such an intimate connection with the position of the jaws that the relation of the latter can in the majority of cases be determined by the occlusion of the teeth—from the study of this relation a correct diagnosis is formed.

The chief aids to diagnosis are: Photographs of the facial outline; such

FIG. 1.

Prosopometer.

instruments as a prosopometer, models of the mouth, and lastly Dr. Grünberg's symmetroscope.* *A correct diagnosis can only be obtained by a careful comparison of the conclusions drawn from*

* See DENTAL COSMOS, April 1912, p. 490.

the employment of each of the foregoing methods and instruments.

Photographs. Profile and full-face photographs are in my opinion foremost in aiding the diagnosis of the relation of the jaws to each other, or of either or of both jaws to the rest of the face. In every case that I have seen, it has been possible to trace the marring of the facial outline to a definite malocclusion by this means. In a great many cases it would be impossible, from a mere study of the occlusion only, to determine the effect on the face.

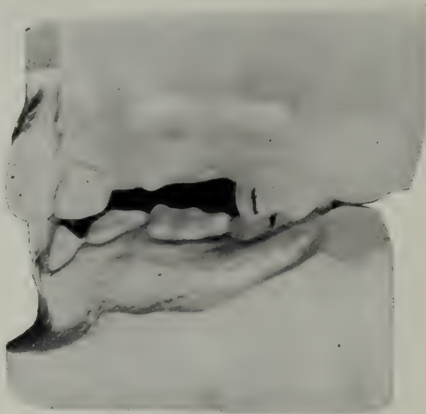
Prosopometers. An instrument known as a prosopometer (Fig. 1) has been

FIG. 2.

used to a considerable extent for determining the distance of any part of the face or teeth from the external auditory meatus. Its accuracy is very doubtful, owing to the flexibility of the meatus and the looseness of the joints of the instrument. It is chiefly useful for verifying other methods, and measuring the amount of growth forward during any treatment.

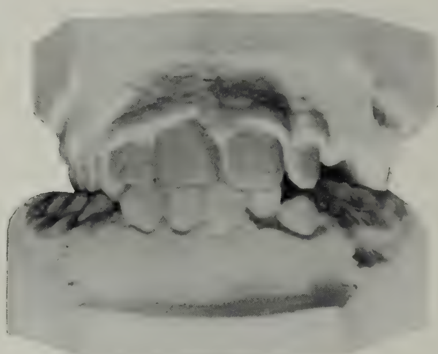
Plaster models. The method next in importance to photography is the study of models of the mouth. For this purpose the models should be divided into two classes, the first to include those cases where there is little or no irregularity of the teeth—*i.e.* when the teeth form a regular arch but there is a malrelation of the opposing teeth and jaws, and the second to include those cases where there is great irregularity of the teeth, with or without malrelation of the jaws. Examples of the latter class are

FIG. 3.



extremely complicated and are the result of many causes, the chief of which is mutilation. It is in the study of these cases that Dr. Grünberg's symmetroscope is of the utmost value.

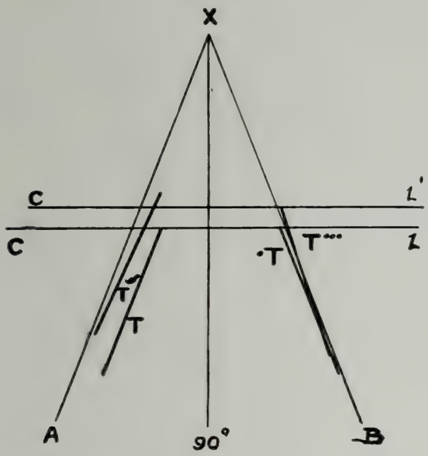
FIG. 4.



Grünberg's symmetroscope. This instrument has been devised for the determination of the symmetry or asymmetry of the arch, or, I should prefer to say, for determining the relation of the homologous teeth from the center of the mouth. Dr. Grünberg brought for-

ward his symmetroscope two years ago at the meeting of this society. At that time it was very difficult to criticize

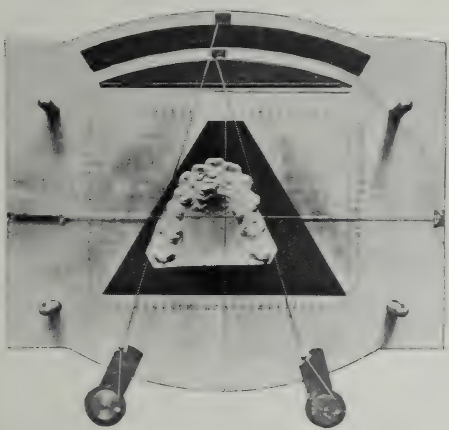
FIG. 5.



his work, as it required practical experience and much thought.

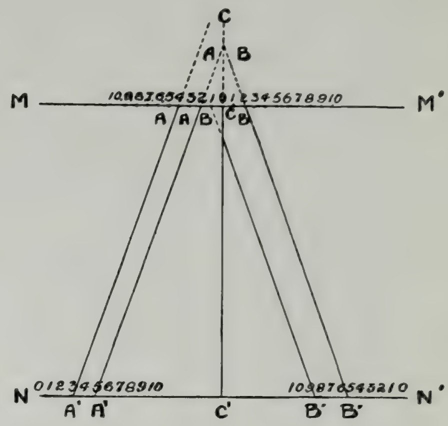
Most of us are agreed that it is practically impossible to design an instrument

FIG. 7.



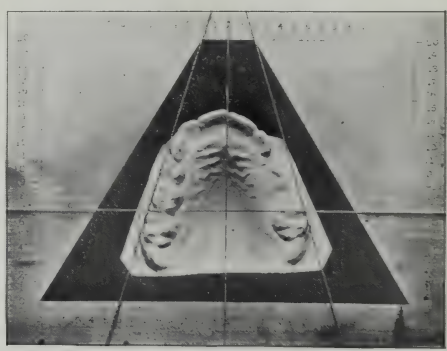
that will show accurately all malocclusions, inasmuch as there is no constant point from which to measure. After examining most of the models in my possession, I believed for a considerable time that Dr. Grünberg's instrument was as accurate as possible, though the correct diagnosis of one case seemed doubtful to me. It was a case where the whole

FIG. 6.



of one side of the upper arch was in lingual occlusion (Figs. 2, 3, and 4). It appeared to me that, in setting, the model would have to be twisted, so that the center line—90° line—was no longer

FIG. 8.



in or parallel to the median plane of the jaw. (See Fig. 5.)

A MODIFIED SYMMETROSCOPE.

This led me to experiment, and resulted in the production of a modification of the symmetroscope which I now use.

This modification permits of the 90° line being kept parallel to the median plane of the jaw; in principle it is identical with Dr. Grünberg's.

Fig. 9.

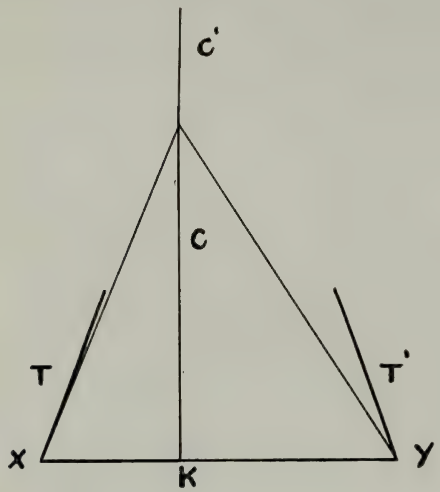
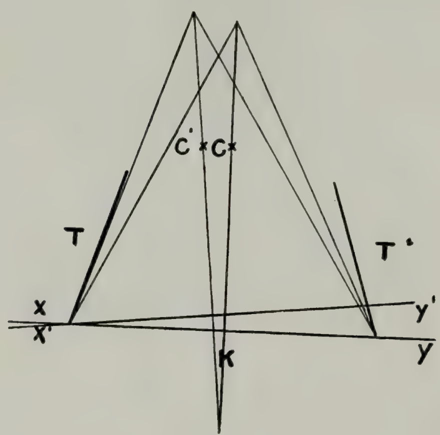


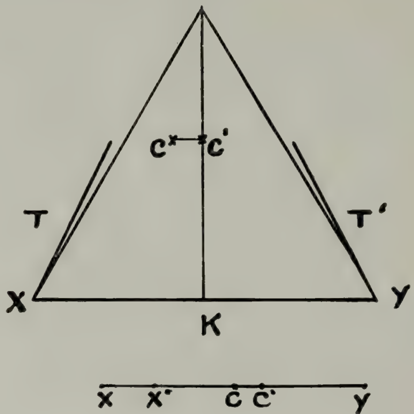
Fig. 6 is a diagram of this modification. AA′ and BB′ are the side lines. These differ from those in Dr. Grünberg's instrument, in that they are free to move at the upper end along the horizontal scale MM′ and at the lower end along the scale NN′, so that they are

Fig. 11.



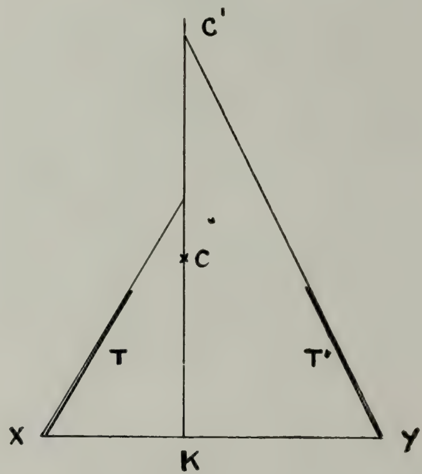
capable not only of rotation around a point on the center line CC′, as in Dr. Grünberg's instrument, but also of a movement parallel to themselves. The

Fig. 10.



line CC′ is fixed. The scale MM′ is measured off in millimeters from C as zero in both directions. The scale NN′ is marked off in millimeters downward from C′ to zero on both sides at N and N′. The object of this device is to set

Fig. 12.

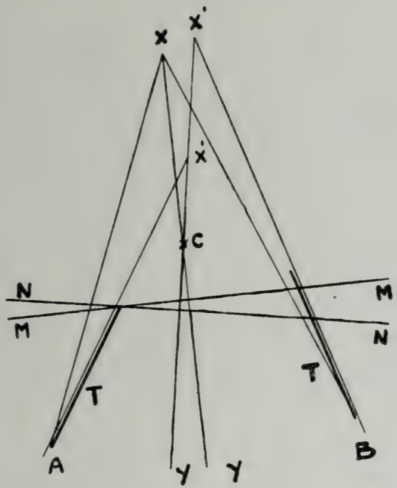


the lines AA′ and BB′ at equal angles with CC′. When the sum of the readings of A and A′ equals the sum of the

readings of B and B′, the lines AA′ and BB′ are forming equal angles with CC′.

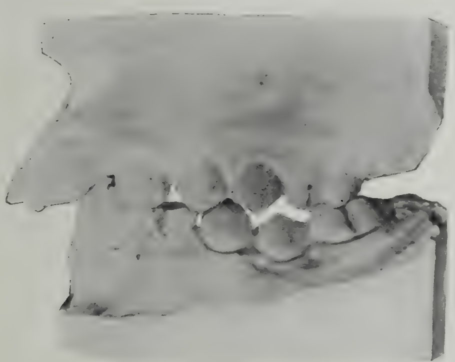
Fig. 7 is a photograph of the modified instrument.

Fig. 13.



I again examined the original case mentioned, and obtained exactly the same result as by Dr. Grünberg's symmetroscope (Fig. 8). I made further experi-

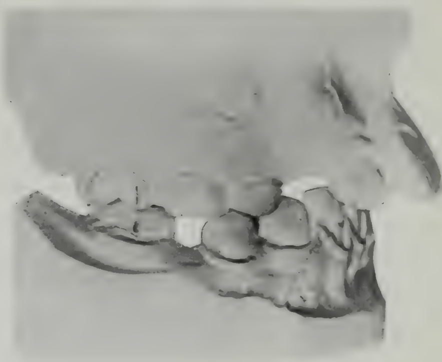
Fig. 15.



ments with two definite types of cases, as follows:

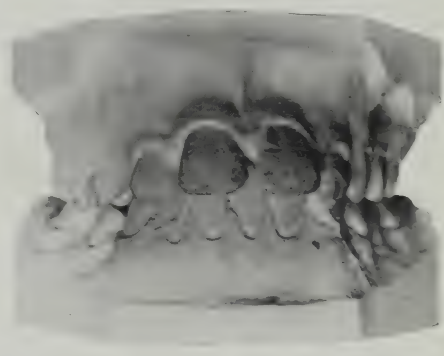
(1) Cases in which the molars and premolars on one side were in lingual occlusion, but were normal mesio-distally, and the center—between the central incisors—was normal mesio-distally; and (2) Cases in which the molars and premolars were in normal position, but the center had drifted to one side.

Fig. 14.



Let us consider the first case. In Fig. 9, T and T′ are the molars and premolars; the row T is in lingual occlusion; C is the center between the central incisors. Since the molars and premolars are normal mesio-distally when the model is inserted in the symmetroscope, the 90° line should be at right angles

Fig. 16.



to the lines joining homologous points on these teeth.

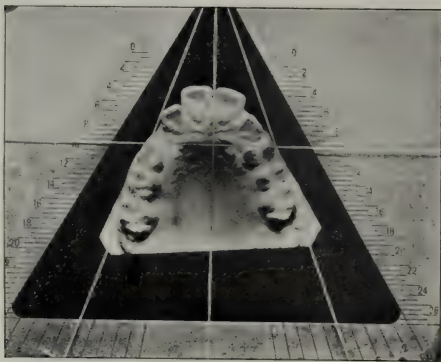
COMPARISON BETWEEN GRÜNBERG'S AND THE WRITER'S SYMMETROSCOPE.

From the figure, it is evident that it is impossible to set the model according

to Dr. Grünberg's instructions, and yet have the center line at right angles to lines joining homologous points on the teeth. Let us take, for instance, the two homologous points X and Y, join them, and draw C′CK at right angles to XY. Then XK must be less than KY, since C, the center, has not drifted, and X is a point on a tooth in lingual occlusion, while Y is an homologous point on an homologous tooth in normal occlusion. Hence no lines drawn from X and Y to any point on C′K can form equal angles with C′K. If C had drifted to C′, so that CC′ was half the lingual occlusion of T, then Dr. Grünberg's instrument would give a correct reading; for if we draw C′K at right angles to XY, then XK and YK are equal, and the side lines from any point on C′K form equal angles with C′K (Fig. 10). These were the conditions present in the model which I mentioned before as having led me to think of the modification suggested. (See Figs. 2, 3, 4 and 8.)

Fig. 17.

Fig. 18.



A similar failure occurs in the application of the instrument in a case where the molars and premolars are normal and the center has drifted to one side. Indeed, the same figure will serve to demonstrate this if we assume T and T′ normal and C to be the center, drifted to the left. (See Fig. 9.)

Fig. 19.

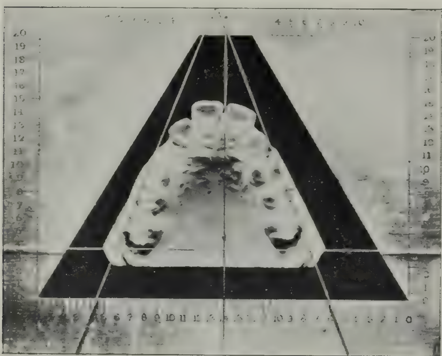
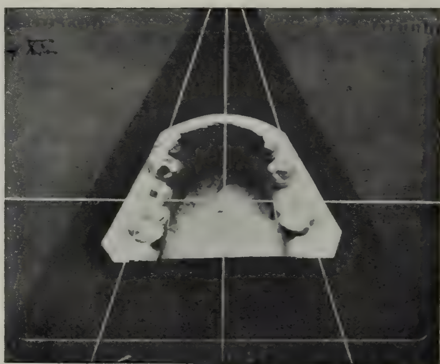


Fig. 20.

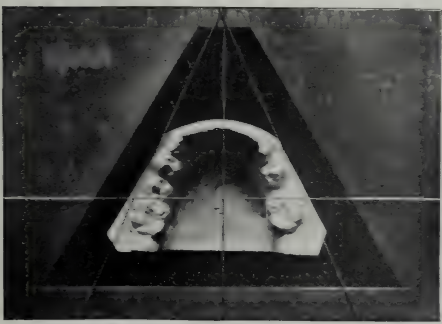


When Dr. Grünberg's instrument is used in either of these cases, the center line will not lie in or parallel to the median plane of the jaw, but will be inclined toward it, hence the instrument

will register an apparent mesial displacement of the molars and premolars. (See Fig. 11.)

With my modification, however, a correct reading is obtained. The side lines

Fig. 21.



are moved about until they lie along homologous points on T and T′, and form equal angles with the center line CC′, which also passes between the cen-

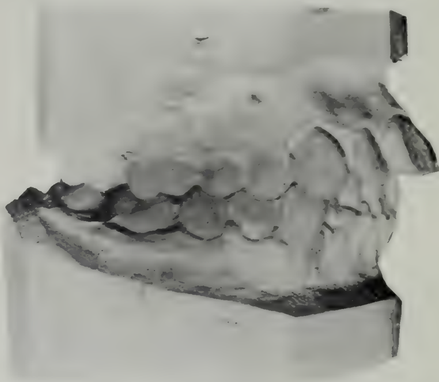
Fig. 23.

tral incisors. At the same time they form equal angles with the median plane of the jaw, hence CC′ lies in or is parallel to the median plane of the jaw, and is at right angles to the line joining homologous points. (See Fig. 12.)

CASES IN WHICH GRÜNBERG'S SYMMETROSCOPE IS INADEQUATE.

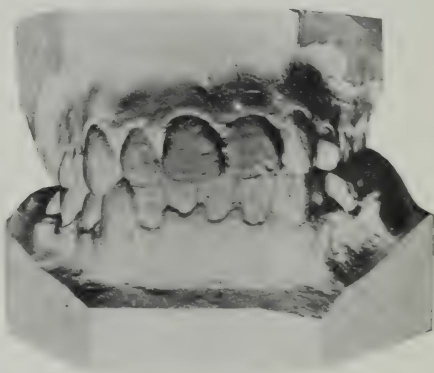
From my work on these two hypothetical cases, I concluded that under

Fig. 22.



the following conditions Dr. Grünberg's symmetroscope fails:

Fig. 24.



(1) When one side of the arch is in lingual or buccal occlusion, including the most distal tooth, the center—between the central incisors—of the arch being in its normal position mesio-distally.

(2) Where a portion or the whole of one side of the arch is in lingual occlusion, owing to mutilation, on account of

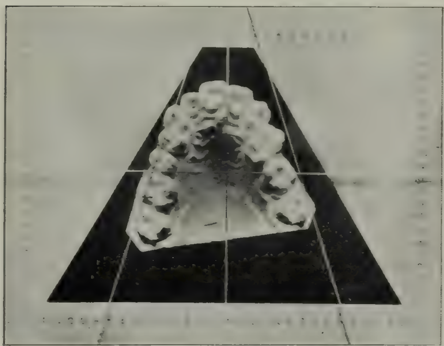
the teeth coming forward and occupying a narrower part of the arch, the center of the arch being in its normal position mesio-distally.

(3) Where the center of the arch—between the central incisors—has drifted to one side or the other.

(4) Where there is a combination of the first two, and under favorable conditions, of the first three cases.

As can readily be seen, one or more of these conditions is present to a more or less marked degree in 50 per cent. of cases of malocclusion which are the result of mutilation.

Fig. 25.



It has to be assumed, in the use of this symmetroscope, that the planes of the sides of the arch form equal angles with the median plane of the jaw. If, however, there is a rotation of the plane of one side, the modified instrument gives an inaccurate reading. The degree of inaccuracy will depend on the homologous points selected to determine the position of the side lines. Fig. 13 shows this; the more distal to the rotation are the homologous points chosen, the less would be the inaccuracy. With Dr. Grünberg's instrument, a correct reading would be obtained in this case, provided the homologous points chosen are distal to the rotation.

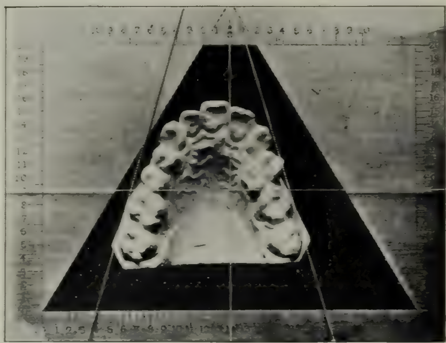
The conclusion which I draw from this work with the modified instruments is that, in the majority of cases of mutilation of the teeth anterior to the first molar, the first molar does not drift as much forward as Dr. Grünberg's symmetroscope indicates. (See Figs. 14–26.)

THE CORRECT INTERPRETATION OF DR. ANGLE'S CLASSIFICATION.

I now turn to the other matter which I wish to discuss. There is nothing connected with the science of orthodontia which is more abused, or rather misused, than Dr. Angle's classification to which I have referred above.

There are two possible interpretations of this classification. The first—I be-

Fig. 26.



lieve Dr. Angle's—which is used and understood by a few, is its interpretation as a classification of the jaws, indicated by the relation of the first molars when the latter are in correct relationship to their respective jaws. There are many passages in Dr. Angle's book which support this view; also in a discussion of Dr. Grey's paper entitled "Malocclusion of the Teeth: Diagnosis," published in the *American Orthodontist,* vol. i, No. 2, Dr. Angle says—"There are two ways of looking at the matter. First, to make the diagnosis from the present appearance of the teeth or from the symptoms only; and second, from the basis of normal occlusion—the only true way to make a diagnosis of malocclusion." Later on, he says—"So I would say, judge not from appearance, the positions of the teeth that have migrated, but

from the normal position of the upper first molar. And where any mutilation has occurred, and is followed, as it inevitably is, by the shifting of the position of the remaining teeth, then study to resolve the occlusion into its original condition, and correct diagnosis will not be difficult."

At the meeting two years ago, great emphasis was laid on this matter by Dr. Grünberg.

The majority of dentists and orthodontists have adopted the second and incorrect interpretation of the classification, and have considered it as purely and simply a classification of the relationship of the teeth, the upper molars being considered to be in normal position in all cases.

I have attended many orthodontia meetings where cases were classified by this latter method. In some such cases, if the operator succeeded in treating them according to his diagnosis, he would surely bring about a worse malocclusion than had previously existed.

It certainly appears to me that orthodontia would become a more exact science if an authoritative statement were made as to Dr. Angle's classification, as it is the classification that is most commonly adopted by the profession throughout the world.

It is quite possible that worse forms of irregularities are found in Europe, as there is far more mutilation; also the cold, damp climate of many parts of England and Ireland seems to produce a greater percentage of abnormal adenoid growths, and for this reason it is more important that a correct diagnosis should be made in those countries; for improper or inadequate treatment of such complicated cases must produce a disastrous result.

Would it not be to the interest of this society and to the welfare of orthodontia all over the world that the truths concerning the classification of malocclusions of the teeth be spread widely, and not limited to the few who have the privilege of being members of the Alumni Society of the Angle School? Four years ago an orthodontist who understood the classification said that he thought it was Dr. Angle's greatest work; and surely it is our duty to see that it holds its proper place in orthodontia.

SOME OBSERVATIONS UPON THE USE OF VACCINE IN THE TREATMENT OF PYORRHEA ALVEOLARIS OR CHRONIC ALVEOLAR OSTEOMYELITIS.

By ALVIN W. VINEY, D.D.S., Pasadena, Cal.

(Read before the meeting of the Los Angeles Association of the Dental Alumni of the University of Southern California, December 12, 1913.)

SINCE the time when Dr. Riggs first described pyorrhea alveolaris, theories of etiology, pathology, and therapeutics and treatment *ad infinitum* have been offered to explain the probable relations, systemic and otherwise, which are concomitant with the disease itself and may have a bearing thereon. I would not arrogate to myself any particular ingenuity or faculty of reflection, but phases of this disease have presented themselves to my observation which, whether they be absolutely correct or merely furnish a hint along the line of further investigation, may not be uninteresting to the careful observer. I am surely trying just as hard to find reasons to doubt them as to find proofs

to substantiate them, for no matter how conscientious an investigator be, his investigation, in order to be scientific, must be an open-minded one, with as much effort to disprove as to prove. Even after having thrown aside all his opinions as slag and started at the bottom again, with the hope of finding good ore, the indefatigable researcher may discover a new mineral or element somewhere within the slag as a reward of his perseverance and theories, even as the Curies did, and as has been done repeatedly for the benefit of chemists. It is given to but a few to stumble upon ideas which may save a life, or even to make a guess which may make someone's road easier or safer to travel upon. But as some are born to think ideas of government and others to work for the immortality of souls, so it devolves upon dentists to alleviate some of humanity's suffering.

RECOGNITION OF THE DENTAL BY THE MEDICAL PROFESSION.

My principal argument is not that dentists are entitled to greater respect from the medical profession, but that, on the contrary, that respect would be forthcoming if we would assist the medical profession rather than object to their criticism. Many hospital staff members have recently told me that they realize the great need of a dental specialist in their institutions. One case in particular was cited, being that of a man who had been eighteen months in bed and on whom the most extreme care had been expended diagnostically to discover some causative lesion, and for whose recovery, after eighteen months, the hospital authorities had proclaimed positively nothing could be done until his mouth was placed in a sanitary condition. If then, the medical profession is willing to accord to us such recognition, is it not better policy for us to apply ourselves more assiduously to scientific research ?—and the medical profession will not hesitate to "render unto Cæsar the things that are Cæsar's."

Referring to the subject of this paper, I am not assuming either to have reached any final conclusion, nor yet to have been able to carry out my work with the finality which this subject not only permits, but in fact actually demands. It is fondly hoped, therefore, that others may continue along the same line of work with the purpose of ultimate finality in mind.

In considering vaccines as a means of treatment, I was first actuated by my notice of the almost miraculous results achieved by their means in the treatment of diphtheria, tetanus, and other virulent diseases, not excepting hydrophobia.

NOMENCLATURE.

I, too, am of the opinion that pyorrhea alveolaris should be called chronic alveolar osteomyelitis, for we all know that our so-called peridental membranes are indeed nothing if not intra-alveolar dental ligaments. Therefore inflammation of the dental alveoli—which are, in fact, medullary portions of the maxillary bones—is really osteomyelitis, because osteomyelitis is primarily an inflammation originating in or extending to the medullary structures. From a clinical standpoint, it is very difficult to differentiate between the inflammatory characteristics of pyorrhea and osteomyelitis, because almost invariably one leads into the other. Osteomyelitis is essentially an infectious disease, and may involve any cellular portion of the bone as well as the marrow. It is caused by pyogenic micro-organisms, and is claimed by recent observers to be usually due to the presence of streptococcus, pneumococcus, tubercle bacillus, the colon or typhoid bacillus. It is characterized by vascular distention followed by coagulation, necrosis, liquefaction of intercellular substance, a development of purulent foci, and the ultimate destruction of the bone with a discharge of pus from the sinuses, or "pyorrhea." All of these conditions are present in pyorrhea alveolaris, the alveolar socket representing the "bone cell" which is involved. There are almost invariably "necrotic portions" on the root substance itself, and there must

necessarily be circumscribed portions of inflamed soft tissues, and sequestrated portions of alveolar process, as is demonstrated practically invariably by surgical interference in the form of extraction of the offending member, when there is usually an entire elimination of the purulent foci. This clinical picture, however, is not absolutely constant, for occasionally we find that the resulting infections are contemporary with the incipient stage, and persist after the removal of the offending tooth; and since these conditions are largely confined to the alveoli and are chronic in character, they ought to be termed chronic alveolar osteomyelitis rather than pyorrhea alveolaris.

ETIOLOGY.

The disease itself we are compelled to consider from one of three viewpoints, or possibly from all three of them—viz, either as a mere local manifestation mechanical in character; as a local manifestation accompanied by infection, or as both complicated with systemic phenomena. I am now almost convinced that these manifestations are practically inseparable, for we are all familiar with the local inflammatory condition, which is benefited by mechanical interference. Whether this phase is systemic in its inception I will leave for someone else's consideration; but whenever the inflammation is accompanied by infection and attendant pyorrhea, it would seem to be impossible that there is no systemic involvement. Whether this is the cause of the infection or the result of the infection I can only conjecture. Personally, from observations, cultures, and treatments, I am coming to the conclusion that the systemic involvement is probably more the result of the ingestion of this bacteria-laden purulent discharge than the cause of that discharge.

CLINICAL FINDINGS.

Before starting on the question of the opsonic index and vaccine therapy, I had become absolutely disgusted with the innumerable systems of scaling, scaling paraphernalia, and drugs *ad infinitum*, none of which in my experience afford more than temporary relief, lasting only until the recurrence of the foreign irritant, viz, the calculus. This mechanical irritation by the calculus, which is the first observable stage, is immediately followed by local irritation and infection, viz, gingivitis.

I was convinced after a more or less unsatisfactory series of treatments that this trouble was nothing if not true infection, else why this continually recurring pyorrhea from the gums of teeth which seemed to be perfectly well scaled. I determined to attempt to isolate the bacteria in several pyorrhea cases. Usually I found mixed infections, principally streptococcus, but also staphylococcus, usually of the aureus type, pneumococcus, micrococcus catarrhalis, and influenza bacillus. These bacteria are the ones most usually found at the site of infection, whether it be spontaneous, as a result of injury, or due to imperfect blood supply. I immediately gave up the hope of isolating any one germ to be recognized as a permanently constant factor, and determined to try autogenous vaccines to see what results I could obtain. I started by making preliminary examinations of urine, blood counts, and blood-pressure readings in order to see if I could establish some constant systemic symptoms, but my findings would seem to indicate a condition of generally lowered bodily resistance as a cause, rather than some particular condition; that the condition present was the result of a constantly depleted vitality. Strange as it may seem, most of the cases showed a slightly lowered blood pressure, but occasionally one exhibited an increased blood pressure. Most of the cases showed a slightly low hemoglobin test, and a lowered red-blood count when tested with the hemocytometer, while the test with the hemoglobinometer also showed slightly lowered percentages.

IMPORTANCE OF SCALING.

Although I have not been able to keep all of the cases under continuous obser-

vation after treatment for any great length of time, I can report almost every case somewhat improved. Every one, with the exception of a bad tuberculous case, showed some real improvement. In every other case the teeth have become tighter, and in several cases absolutely tight, even without scaling, while those which I had previously scaled with small benefit improved rapidly under the vaccine treatment. Again, in others the vaccine brought decidedly rapid results only after the teeth had been scaled. My very best results were obtained, however, from thoroughly scaling the teeth as well as administering the vaccines, and I desire to state unqualifiedly that I am a most decided advocate of scaling in all cases.

TAKING CULTURES.

The technique of taking cultures is as follows: The mouth is thoroughly rinsed with Wampole's formalid, pure, then the gums around the infected teeth are painted with a strong mahogany-brown solution of tincture of iodin. The gums are pressed until a drop of pus oozes along the tooth; with a thoroughly sterilized platinum wire loop, this pus is picked up and carried into the culture tubes of agar slants to obtain the growth of the culture. These growths were usually made on sterile agar slants, but I used some blood serum tubes and some glycerinated agar, for the sake of experiment only. I am of the opinion that better results are obtained in all cases by the use of mixed-infection cultures than by too much dependence on the opsonic index and using vaccine made from one single organism only. However, there is a wide scope for investigating in this respect.

DOSAGE OF INJECTIONS.

I have been using autogenous vaccines only, standardized to 200,000,000 per cc., a dose usually of 1/20 to 1/10 cc. being given about once in three or four days, depending on the reaction. I inject the vaccines with a thoroughly boiled Burrows & Welcome syringe, with a platinum needle sterilized in a flame. The injection is made subcutaneously near the lower outside border of the deltoid muscle, after the skin has been thoroughly cleansed with 95 per cent. alcohol.

I wish to emphasize especially the danger of giving too large doses, thereby producing a "negative" phase of such extreme or exaggerated proportions as to cause serious systemic symptoms; or too small a dose, and waiting so long before the next dose as to have a sensitized patient and produce anaphylaxis, which is the absolute antithesis of prophylaxis.

HISTORIES OF PRACTICAL CASES.

I hope I may be pardoned if I mention a few cases in detail.

W. L. B. came to me in July suffering with neuralgia, general prodromal condition, lowered vitality, very nervous and worn. He fainted twice during the preliminary examination. His gums were badly swollen and turgid, the teeth quite loose and elongated from the sockets, with heavy deposits of black, scaly tartar, apparently serumal in character, far up on the roots of the teeth. Pressure of the gums caused great beads of pus to ooze to the surface of the teeth. The patient was a blonde, male, thirty years of age, 6 feet 1 inch tall, slight, angular, weighing 155 pounds, married, no children, his pulse rate was 76, his respiration normal, his temperature 98 2/5, but usually subnormal; his blood pressure 130 mm. The red blood count showed 4,780,000; bacterial examination the streptococcus, pneumococcus, micrococcus catarrhalis. The hemoglobin was 80 per cent., the saliva slightly alkaline; the urine acid with a specific gravity of 1.028, with slight sediment, and normal as to odor, color, chlorids and phosphates; no indican, glucose, bile, blood, acetone, or casts were present. The teeth were scaled thoroughly under analgesia. The gums were still full of pus, even after scaling. Treatment was commenced with 1/10 cc. doses of autogenous vaccine standardized to 200,000,000 to the cc., increased by 1/20 to 1/10 cc. according to reactions every four days, until 1 1/2 cc. per dose was given. I then commenced at 1/10 again, and again worked to 1 1/2 cc. Good reactions were regularly obtained from the treatment. At the end of three months all the teeth were tight, and no trace of pus remained in the gums. Treat-

ment was continued, however, for six weeks longer to insure against recurrence.

In this patient a peculiar phase unexpectedly injected itself into my observation, viz, his decidedly improved physical condition, lessened nervousness, and withal, the wonderful improvement in digestion. Gastric symptoms of indigestion had practically disappeared, and while he had been a constant sufferer with intestinal indigestion, he reported that this difficulty had been practically eliminated. I merely mention this in passing, because it indicates how general may be the bearing of the disease on the patient's whole systemic economy, and explains the reason why I think these systemic manifestations to be the result of local infection rather than the cause thereof.

Another case was that of a physician whose teeth I have been scaling religiously for the past eight years, with no positive cessation of flow of pus from the gums. He was treated with autogenous vaccine, a year and a half ago, for three months without scaling. The teeth have not been scaled since. When asked for a report on his case for this paper, the patient informed me that there was no pus around the gums now, nor had there been any for a year, but that the teeth needed scaling badly. In this, I am sure, he is correct, for his teeth needed scaling badly enough a year and a half ago, but I did not scale them, as a matter of experiment. However, I am a most earnest advocate of thorough scaling as a preliminary in all cases, and as a regular part of the treatment.

Another case was that of a lady whose teeth were all loose and greatly elongated. She was treated experimentally without scaling, between the fourth and seventh months of pregnancy, with the full consent of her physician. The flow of pus apparently stopped in less than six weeks, and the teeth became tightened and settled back into the alveoli.

REACTIONS DURING VACCINE TREATMENT.

At this point it might not be improper to mention the different reactions which present themselves as a result of vaccine treatment. The results from the injection of a sterile autogenous vaccine may be placed in two classes:

(1) No result whatever. This indicates either that the vaccine has been oversterilized, or that the dose has been too small.

(2) A decided reaction. This reaction may be divided into two phases, negative or positive. The negative phase may range anywhere from a slight local manifestation, such as pain, tenderness, heat and swelling at the point of injection, to very severe local and systemic symptoms, viz, swelling of the adjacent lymph nodes, malaise, chills followed by a rise in temperature. This manifestation usually follows within from four to twenty-four hours after the injection, and subsides in about the same length of time. It is during the negative phase that the opsonic index reaches its lowest level. This is followed by the positive phase manifested by a feeling of well-being and decrease in the local, viz, alveolar symptoms, and an increased opsonic index. It is during this phase that the succeeding dose should be administered, never while the negative phase is in progress.

PRECAUTIONS TO BE OBSERVED IN VACCINE THERAPY.

In conclusion, I would say that the treatment is very expensive to give, as the preparation of the vaccine takes so much time, and so many details must be observed carefully to obtain tabulated results. Many control cultures are needed to be sure of the sterility of the vaccine, lest the patient be infected with an impure vaccine. Vaccine therapy is a safe enough form of treatment in the hands of a dentist, but a most dangerous thing in the hands of a careless man not particular about details. Sometimes it has been necessary for me to secure and develop as many as half a dozen different vaccines before I could secure the one that was safe to use. Spores will occasionally be found in the vaccines, even after the most religious attention

has been paid to details, and the most painstaking care exercised. In such cases there is no alternative to starting at the beginning again. It is absolutely unsafe to use any hypodermic syringe that has not been thoroughly boiled for at least twenty minutes. All these items require systematic preparation, and must be adequately paid for by the patient. Treatment should be given at least every three or four days. My best results have been obtained in cases where the patient took the treatments for at least six weeks to four months. With the aid of the suggestions offered, a dental practitioner may bring about relief, or maybe cure, in what is one of our most exasperating problems.

POTASSIUM SULFOCYANATE IN THE SALIVA.

By RUSSELL W. BUNTING, D.D.Sc., Ann Arbor, Mich.

WORK DONE UNDER THE AUSPICES OF THE RESEARCH COMMISSION OF THE NATIONAL DENTAL ASSOCIATION.

(Read before the Academy of Stomatology of Philadelphia, March 28, 1914.)

THOSE of us who have been especially interested in the study of dental caries and the forces which determine its activities may sometimes feel that our progress is slow, that the road to success is long, and that the goal is far in the distance. But as we look back along the steps by which we have come we see that we have made some progress, and that year by year we are adding to our knowledge of this great question. Various theories have been advanced from time to time, which, by careful study and co-operation, have been corroborated and established or have been disproved and rejected. Notable among these is that of the controlling effect of potassium sulfocyanate upon caries. It was but a short time ago that the attention of the whole profession was attracted by the enthusiasm of the men who championed this theory. At that time no meeting was complete without a paper on this subject, and the journals were filled with contributions *pro* and *con*. Today the mention of the KCNS theory is like the song that has outlived its day, or the story that has been forgotten. So great has been the evidence in opposition to the premises of this theory, and nothing further having appeared in its substantiation, the subject for the time has been dropped, and KCNS is no longer considered as a factor in the problem of caries.

It is therefore with considerable temerity that I bring you a paper upon a subject which has been so completely shelved, and which has so little bearing upon the problems of today. My defense is that I have come at the request of your committee, who asked that I give the results of my recent work upon the subject, hoping that by this means, and by the discussions which will follow, some addition might be made to our knowledge of the saliva and its reactions. And, indeed, I welcomed the opportunity of presenting my data under circumstances so favorable for intelligent discussion and collaboration as is presented in your society.

SALIVARY REACTION.

In our search for the factors which determine the susceptibility or immunity of teeth to caries, we have long

since agreed that the variable principles are, for the most part, external to the tooth. This has led us to search the saliva, examining carefully each of its constituents, in the hope that one all-important substance or body might be found, the presence or absence of which would determine the susceptibility of the teeth to caries. Of all the tests which have been made in the saliva to this end, perhaps the most spectacular is that of the reaction which occurs in most salivas when they are treated with ferric chlorid. The color which results varies from a light straw through the various shades of amber to blood red. Whenever such a color reaction takes place, it has been asserted that there is present a variable quantity of sulfocyanate in combination with some base such as potassium, sodium, or ammonium, and this is usually spoken of as potassium sulfocyanate.

HISTORY OF KCNS INVESTIGATION.

The late Dr. Michaels of Paris was the first to call attention to the possible bearing of KCNS upon the process of caries. He felt that when present in relatively large amounts it might have an inhibitive action upon the growth of the micro-organisms of caries. Some time later, Dr. Low, Dr. Waugh, and Dr. Beach of Buffalo entered upon an investigation of the KCNS content of the saliva and its relation to caries. In their publications they stated that they found that substance in the salivas of immunes, while in the salivas of susceptible individuals it was conspicuous by its absence. So certain were they of the efficiency of this salivary constituent, that they urged all dentists to test the salivas of their patients with ferric chlorid, and in case there was no reaction, advised that KCNS be administered in regular doses, until it appeared in the saliva. The startling assertions which were made and the enthusiasm of these writers stirred up a general interest in salivary analysis among the dentists throughout the land. Hundreds of practitioners made the simple test as a daily routine of practice, testing the salivas of all patients and administering the drug wherever it seemed advisable. As a result of this, many valuable data were secured, but it was soon found that the results of many careful and fair-minded men were not in accord with those of the original promoters. In the statistics thus obtained it was not so evident that there was a relation between immunity and the presence of KCNS, nor that the administration of that compound produced an absence of the carious process. In addition to this, the scientific investigations of Gies, Lathrop, Pickerill, and many others were decidedly against the theory as stated.

THE KCNS REACTION.

As I have been intensely interested for the past several years in the problem of dental caries, I began work upon this phase of the problem soon after it was first reported by Dr. Low and his *confrères*. Tests were made upon students and patients in the infirmary, using the method suggested for determining the KCNS in the saliva, and carefully tabulating the results. I soon found that my data did not check with the theory, there being so marked a discrepancy that I was unable to subscribe to the views of the men who had advanced it. I then became interested in the test which was suggested for these determinations, namely ferric chlorid. It seemed very strange that, when we used ferric chlorid in the urine, we called the substance which gave a red reaction, aceto-acetic acid, and when we used the same reagent in the saliva, and obtained a red color, we said that it was due to KCNS. In addition to this, we know that there are many organic compounds which in their various forms and combinations give a reaction with ferric chlorid which is in many respects like that of KCNS. Everyone who has made many such tests in the saliva, and has attempted to check up the colors produced with a series of standard ferric sulfocyanate strengths, knows how frequently he is puzzled by colors which are not of the same quality

as the standard. They may have strength, but the shade is different, and has no equivalent in the standard. Some of this, it is true, may be attributed to the influence of the mucinous and colloid materials in the saliva, but we may well pause to ask ourselves the question, "Are we certain that this red color is due to KCNS?"

THE WRITER'S ETHER METHOD.

In my attempt to gain a little further information in this regard, I made use of the well-known principle that ferric sulfocyanate is very soluble in ether, and attempted to transfer the red compound formed in the saliva upon the addition of ferric chlorid, to an ether solution. As the KCNS is seldom found in the saliva in such strengths that it may be shaken directly from the saliva to a supernatant layer of ether, it was necessary to dry down the salivas for the purpose of concentration; and having brought about the reaction in a minimum amount of water, ether was poured over, and the solution stirred. In some cases the color came up into the ether very readily, giving a shade which was much darker than that which was originally seen in the water solution. But in other cases, the ether was much lighter in color or refused to take any of the red tint seen in the water.

In the Cosmos for December 1910, I published the results of my observations, calling attention to the discrepancy in the two tests, and stating my opinion that this was due to the fact that there occurred in some salivas substances other than KCNS which are capable of reaction with ferric chlorid.

About one year later the first criticism appeared, in an article entitled "Potassium Sulfocyanate *versus* Diacetic Acid," by C. Franklin MacDonald.* In this he very dramatically calls attention to some very serious errors which had been made in my technique, stating that he had attempted to shake the ferric salt of KCNS in various concentrations from water to ether, and found that he was unable to transfer the color in strengths of KCNS less than 0.0125 per cent. He also called attention to the red color which remained upon the dish after the ether had been poured off, citing it as a source of error.

GIES' CRITICISM OF BUNTING'S METHOD.

In May 1912, Dr. Gies read a paper before the New York State Society,† in which he considered the relationship of sulfocyanates to caries. In this article he takes issue with my findings in no uncertain terms, and summarily dismisses them as unworthy of consideration. In the first place, he objects to my use of the term *potassium* sulfocyanate, questioning as to whether the cyanates exist in the saliva in that form. He very kindly answers his own objection in the same paper, in which he says: "*For the sake of convenience,* it is often assumed that all sulfocyanate in the saliva exists there in the form of *potassium* sulfocyanate."

He further objects to my practice of adding a drop or two of ferric chlorid and water to the dried salivas previous to applying the ether, stating that in this manner the ferric sulfocyanate was dissociated, and being ionized, it became insoluble in the ether. A little later he quotes at length from my paper as follows: "In discussing the supposed advantage of the proposed use of ether, Bunting says [regarding the effect of adding ether to the colored liquid of the *ordinary positive test*]: 'Ferric sulfocyanate, in the *undissociated* state, is soluble in ether; the undissociated portion, therefore, passes for the *greater part* [!] into the ether, a fresh amount of the undissociated compound is formed [?] in the *aqueous* solution, and this also goes into the ether. When the equilibrium is finally established, *there is much more undissociated ferric sulfocyanate in the ether than there was [in undissociated form?] in the water solution [originally?].*'" All of which he

* Cosmos 1912, page 58.

† Cosmos 1913, page 40.

severely questions, and says that the statements do not seem to be based upon experience. In this connection, I might state that the above quotation from my paper, with the exception of the italics, exclamation points, question marks, and bracketed portions, which are Dr. Gies', may be found *verbatim* on page 585 of the 2d edition of Ostwald's "Inorganic Chemistry," as translated by Findlay, from which the statement was taken. Dr. Gies goes on to state that he was unable to shake the red color from saliva to the supernatant ether, and objects to my suggestion that aceto-acetic acid may be present in some salivas.

DR. MAX KAHN'S FINDINGS.

A few months after the Gies report there was issued a brochure containing the work which had been done in the laboratory of Dr. Gies by Dr. Max Kahn upon the sulfocyanates in the saliva. In this, Dr. Kahn also takes up the ether test, and has most nearly followed the technique as suggested. He has made some valuable contributions to the subject, among which he has tried out a long list of substances which, upon addition to the saliva, gave a red color with ferric chlorid. The list of these is as follows: Salicylic acid, phenol, antipyrin, phenacetin, neutral formates, acetates, and succinates, pyrogallic acid, pyrocatechol, creasote, resorcin, benzoates, and meconic acid. In his conclusions he states: "First, the ferric chlorid colorimetric test for thiocyanates in the saliva is inexact and unreliable; second, a negative result by the Bunting suction method is no evidence of the absence of the sulfocyanate in the saliva; third, a positive result by the Bunting suction method is evidence of a comparatively large amount of sulfocyanate in the saliva; fourth, various medicinal substances and chemical compounds that are the result of the decomposition of proteins and carbohydrates may, if excreted in the saliva, give a very marked red coloration when treated with ferric chlorid, and thus convey the impression that the amount of sulfocyanate is very large."

PICKERILL'S VIEWS.

The latest work of importance bearing upon the subject is the work of Dr. Pickerill* in the reference made in his book on Dental Caries. He says in this connection: "I am not prepared to accept Dr. Bunting's theories. First, Is the etherial solution more reliable than the watery solution of potassium sulfocyanate? The following simple tests give the answer in the negative." He then gives a series of tests in which he attempts to shake ferric sulfocyanate from water to ether, and meeting with difficulty in doing so, concludes that it cannot be done. "Second, Is the possible presence in the saliva of other substances which give the ferric chlorid test a serious source of error?" To this he also objects, stating for his reasons that aceto-acetic acid does not occur in the saliva, and that it would be unlikely that any drugs might occur in the saliva which would confuse the reaction.

TECHNIQUE OF THE ETHER TEST.

In all of this I have been naturally very much interested. It has been curious to note, first, the number of different interpretations which may be made of a seemingly clear statement; and second, the difficulties which might be encountered by those attempting the use of the technique suggested. I felt very confident that in my hands the method had been giving me trustworthy results, but in view of the experiences of others, many of whom were learned and able chemists, it seemed worth while that I look farther into the basic principles of this test with the view of standardizing the method and estimating its accuracy. With this in view, I have spent some considerable time in the consideration of the problem, the results of which I have the honor of bringing to you this evening.

The original statement of my working technique reads as follows: "Pour 5 cc. of saliva into a thin curved watch-crystal

* "Prevention of Dental Caries and Oral Sepsis." Pickerill, p. 171.

of about three inches in diameter. Allow this to stand in the air or sunlight, or better still, set it on a slowly steaming water-bath, until the saliva has dried to the dish. To this add one or two drops of water and one or two drops of $FeCl_3$, and stir with the residue to make a thick paste. To this add 5 cc. of ether, and stir the paste thoroughly. When well mixed, hold the glass on a level with the eye and note the color of the solution." The objections of my critics are that they are unable to shake solutions of ferric sulfocyanate from water or salivary solutions to ether, they are unable by the drying process to get all the color to come up into the ether, and they were able to carry out the test only in solutions which contained a relatively high percentage of KCNS.

As a first step, I attempted to standardize my reagents and records of reactions. For this purpose I made solutions of KCNS of graded strengths, ranging from 0.0001 per cent. to 5 per cent. Ten-cubic-centimeter samples of each were placed in test tubes, the tubes corked, and placed in their proper order in a test tube rack. To each was added one drop of concentrated HCl, and one drop of ferric chlorid solution. The resultant colors were taken as standard on all future readings. The ferric chlorid solution contained 25 per cent. of anhydrous ferric chlorid in a slightly acidulated water solution. The size of drop used was about 15 per cc., and this has been used throughout the report unless otherwise specified. Instead of pure ether as a solvent, we have made use of a mixture of amyl alcohol 5 parts and ether 2 parts, according to a suggestion made by Stokes and Cain in their determination of small quantities of iron.* This mixture is a much better solvent of ferric sulfocyanate than is ether alone.

Our first task was to study systematically the interchange of the red ferric sulfocyanate from water to ether. We began with the weakest strengths of KCNS, taking 10 cc. samples in a test tube, acidulating, and adding 1 drop $FeCl_3$. After the reaction had taken place, 10 cc. of ether was poured over, and the whole shaken. It was found that it was impossible to cause the ether to take up any of the red color in the weak solutions. The strength was gradually increased until 0.08 per cent. was reached, when a slight trace of color was noticed in the ether. As the KCNS was increased in concentration a greater increase in the ether absorption took place. At 0.2 per cent. the water and ether solutions were equal, and at 0.5 per cent. the ether reading was equivalent to 1 per cent., being *stronger than it was originally in the water solution.* Going over the same procedure with alcohol and ether solution instead of the ether, it was found that the first trace of absorbed color could be seen in a solution which was 0.03 per cent. At 0.05 per cent. the water and supernatant alcohol-ether solutions are nearly equal, while the 0.1 per cent. gives a color to the alcohol-ether which is equivalent to a 5 per cent. water solution. So also do the strengths above this give *stronger colors* to their alcohol-ether solutions *than was originally seen in the water solutions.*

There are a number of factors which may enter into this reaction which are confusing and not easy of comprehension. For instance, if too little of the ferric chlorid solution be used, the alcohol-ether solution, instead of taking up the color, decolorizes the whole solution, and if more reagent be used the proper reaction takes place. Also, if a slight excess of acid be used, the red color in the alcohol-ether solution is entirely discharged. This has been explained by Stokes and Cain† as being due to the fact that iso-disulfocyanic acid is formed which reduces the ferric salts to ferrous compounds, which are colorless. A great many interesting phenomenon may be seen in the study of the transference of ferric sulfocyanate from water to ether

* "On the Colorimetric Determination of Iron with Special Reference to Chemical Reagents," by Stokes and Cain, *Journ. Amer. Chem. Soc.*, vol. xxix, p. 409.

† *Ibid.*

solutions which there is not time to consider in this paper. It is sufficient for our purpose to note that the *absorption by the ether depends upon the concentration of the ferric sulfocyanate, and that above certain concentrations the ether color reaction is stronger than that of the water.*

We then made a series of tests in which the various strengths of KCNS in water were dried down, and brought up in alcohol and ether. In all of these, 5 cc. samples were evaporated in watch-glasses, a *small* drop of ferric chlorid stirred into the residue, and 5 cc. alcohol-ether was poured over. After stirring the solution carefully, the alcohol-ether was poured off into a test tube, and the color compared with the standard colors. By careful technique, a distinct color may be obtained from a solution which contains 0.0001 per cent. KCNS. A few of the results obtained in the various concentrations are as follows:

Per cent.		Per cent.			
0.001	KCNS	= 0.003	in	alcohol-ether.	
0.002	"	= 0.005	"	"	"
0.003	"	= 0.007	"	"	"
0.005	"	= 0.01	"	"	"
0.008	"	= 0.02	"	"	"
0.01	"	= 0.03	"	"	"
0.02	"	= 0.08	"	"	"
0.03	"	= 1.00	"	"	"
0.05	"	= 5.00	"	"	"

From this we may readily see that the colors obtained by the evaporation method and alcohol-ether solvent are from two to five or more times as strong as are formed in the corresponding water solutions.

In explanation of this phenomenon, there are two pre-eminent factors which should be noted. As we have seen, the interchange of red color from water to ether solutions on shaking is dependent upon the concentration of the ferric sulfocyanate molecules in the water solution. We saw that weak solutions could not be thus transferred, but that all solutions having a concentration equal to or above 0.05 per cent. could be extracted by alcohol-ether. If, however, we take a 5 cc. sample of a solution weaker than 0.05 per cent., evaporate it to dryness, and produce a reaction between the KCNS and ferric chlorid in a small drop of water, we have concentrated our molecules of ferric sulfocyanate in solution about one hundred times. In this manner we can bring solutions containing 0.0005 per cent. KCNS to have the same concentration as 0.05 per cent., and which should be as readily absorbed by the alcohol-ether. Secondly, when we shake various solutions of ferric sulfocyanate from water to ether, there is always a variable amount of red color remaining in the water solution. But if, on the contrary, we concentrate to the smallest possible volume capable of giving a complete reaction between the KCNS and ferric chlorid, the ether solution when poured over will completely dissolve the color from the water, leaving no red color behind. We have, therefore, in the concentration method, brought about a condition in which all of the ferric sulfocyanate may be transferred to the ether solution, and as the color of this salt is more brilliant in ether than in water, we have a resultant color several times stronger than that of the water solution, as is shown in the table given. All of which serves to show the fallacy of the attempt of many investigators to check the method suggested by the process of shaking, as well as their condemnation of the method upon these grounds.

We next began a series of experiments with the view of determining whether the same reactions could be brought about in salivary solutions of KCNS as were seen in the water. To this end a number of tests were made, in the following manner: Two 5 cc. samples were taken of salivas which were negative to ferric chlorid. To each of these ½ cc. of a 0.1 per cent. KCNS solution was added. One solution of each pair was dried on a watch-crystal, two drops of ferric chlorid solution were stirred in, and 5 cc. alcohol-ether poured over. The colored alcohol-ether solution was decanted into a test tube and compared with the standard colors, and with the other sample of the pair, to which one

drop of HCl and two drops of ferric chlorid had been added. In each case the equivalent color in alcohol-ether was obtained, being much stronger than the water solution control. In all of the samples which were tested in this manner, none were found which did not respond to the test as stated.

OBSERVATIONS CONCERNING THE ETHER TEST.

In regard to this series of experiments, several points of interest should be cited.

First. It was found that, although one drop of ferric chlorid was sufficient to bring about a complete reaction with the KCNS in 5 cc. of a water solution, it was necessary to use two drops for the same amount of a salivary solution. This may be explained by saying that a portion of the ferric compound entered into combination with some of the salivary constituents, and the remaining portion was not sufficient to complete the sulfocyanate reaction. The addition of the second drop usually produced the maximum color.

Second. It was seen that the resultant color, when KCNS and ferric chlorid were added to KCNS negative salivas, was not always the same. In many cases it seemed as if a portion of the KCNS had entered into combination with the constituents of the saliva, and a much lower reading was obtained in both salivary and alcohol-ether solutions than would have been produced in water solutions.

Third. In making the alcohol-ether solution, it was frequently seen that a colored material remained on the watch crystal after the alcohol-ether had been poured off. This was noted by MacDonald, and was pointed out by him as a source of error. If this residue is examined, it will be seen that, after all the alcohol-ether has been drained off, the material is not red, but yellow, that it has all the appearances of a colloid, and will not answer any of the tests for sulfocyanate. In view of this, and in view of the fact that we can see no loss of sulfocyanate in our tests, we may infer that this substance is some colloidal iron compound in combination with the mucins of the saliva. The formation of this compound may be almost entirely eliminated, if, instead of stirring the ferric chlorid *into* the dried film of saliva, it be lightly smeared over the surface, and allowed to stand for a minute or two, until the reaction is complete, before pouring on the alcohol-ether.

Fourth. In the case of evaporated water solutions, it was necessary to use but a small drop of ferric chlorid solution to bring about the complete reaction preparatory to absorption by the alcohol-ether, but in the case of salivas, more ferric chlorid must be used. Two, three, or even more drops are necessary to complete the full reaction, depending upon the viscosity of the saliva. The amount to be used must be determined by the rule that the reaction between ferric chlorid and KCNS must be brought about in a *minimum amount of water.* If this rule be followed, the solution will be as complete in the case of the saliva which requires four drops, as with the water solution which requires but one. If an excess of water be used, the balance of equilibrium is destroyed, and no absorption takes place.

Fifth. It was found that it was impracticable to form the ferric sulfocyanate compound in water previous to drying down, for in the process of evaporation some other compound salt of iron is produced, which is insoluble in ether. Care should also be taken in mixing the ferric salt with the KCNS solution on the watch-glass that the mixture does not dry down, in the event of which the insoluble compound is formed.

Sixth. KCNS solutions which are to be evaporated and brought up in ether should not be acidulated, as the ether solutions of ferric sulfocyanate are rendered colorless by the addition of acid. The danger that even the weak solutions will be hydrolyzed without acidulation is quite remote, as in evaporation the concentration of molecules is increased, and the water greatly diminished.

LATEST MODIFICATION OF THE ETHER TEST.

The test as it is carried out by the author at the present time may be stated as follows: Evaporate 5 cc. of the sample to be tested on a watch-crystal or small evaporating dish. To the dried film add ferric chlorid drop by drop, spreading it gently with a glass rod; use just enough to moisten the whole film. Allow the mixture to stand for from one to two minutes, and then pour on 5 cc. of alcohol and ether. Stir gently with a glass rod until all the color has been taken up by the etherial solution. Decant solution off into test tube, and compare with an ordinary water test of same sample.

According to the foregoing method, a large number of salivas were tested by the author. In these tests it was seen that in the alcohol-ether solution many salivas gave a resultant red color which was much stronger than that in the water solution, the color being approximately equal to the alcohol-ether equivalent of the water reaction. There were, however, many cases in which the alcohol-ether color obtained was no stronger than that of the water solution, and in other cases it was decidedly less. If, as we have seen, KCNS may be detected by the alcohol-ether solution when it is present in the saliva, and if the color thus obtained is stronger than the corresponding water test, we can but conclude that in those cases in which the proper color is not produced in alcohol-ether, the color seen in the salivary solution is due in part to some substance other than KCNS.

MERIT OF THE ETHER TEST.

That this test leaves much to be desired is frankly admitted by its author, but it is his opinion that anyone who carefully carries out the method as suggested upon a number of different salivas will recognize the discrepancy between the alcohol-ether and the water test, and will be convinced of the unreliability of the latter. The alcohol-ether test does not specify the nature of the interfering substance, and indeed the name of its class may be Legion, nor does it eliminate all such compounds, for many of the benzoates, acetates, and other substances are soluble in ether. But, imperfect as it may be, the alcohol-ether test indicates KCNS when it is present. The failure of the ordinary water test to check with that of the alcohol-ether very clearly indicates a multiple reaction which cannot be looked upon as a true index to the KCNS content.

UNRELIABILITY OF SALIVARY INDICATORS.

We have then, in the case of this salivary constituent, another instance of the unreliability of salivary indicators. One cannot go far in the study of the saliva without being impressed with a doubt of the veracity of the methods of analysis which are in general use today, and in view of this is led to question the value of the data thus obtained. The saliva is such a combination of organic and inorganic salts, the whole being enveloped in a variable amount of mucinous colloid—which has the property of combining with any of these substances or the reagent used—that the quantitative estimation of the components of the saliva, or the standardization of their reactions, is a difficult and complicated matter. It is very necessary, if we ever hope to gain an accurate knowledge of the saliva, that we take steps toward improving the technique of our investigation. Perhaps the reaction which most needs verification and standardization is that of the indicators by which we determine the acidity and alkalinity of the saliva. The present methods are very seriously open to criticism, and work is being devoted to this phase of salivary analysis to perfect a technique which may be more trustworthy.

As a more accurate method of determining the sulfocyanate content of the saliva, Dr. Gies suggested the Rupp, Schied, and Thiel iodometric method.*

* *Ibid.*

There is no doubt but that the method as given is the most accurate quantitative test which we have at our command, but, as Dr. Gies says, it is so complicated that it is not adaptable to clinical uses.

CONCLUSIONS.

The alcohol-ether method as described in this paper has the advantage of ease and practicability of working, it is positive to KCNS when present, giving a more vivid reaction than the water solution, and it eliminates all those confusing substances which may be present in the saliva and which are not soluble in alcohol or ether. The writer has given this detailed description of the process in order that the method might be fully understood and with the hope and expectation that others would check the results obtained, so that by mutual co-operation a trustworthy method of determining the sulfocyanate content of the saliva may be obtained. If by these means the interest of any may be turned to the scientific investigation of the saliva and its reactions, the paper will have served its purpose.

In the investigation of this reaction over 200 specimens of saliva were examined, and a careful record taken as to the condition of the teeth and their susceptibility to caries. From these it was estimated that approximately 28 per cent. of the immunes were KCNS positive, and 27 per cent. were negative. Of the susceptible cases, 29 per cent. were positive, and 16 per cent. were negative. All such data are open to two serious objections—first, that the samples taken were not a true index to the total salivary secretion for twenty-four hours; and second, that it is often impossible to say definitely in which class, immune or susceptible, many cases belong. There were, however, among these many clearly defined cases of immunes and susceptibles, and among these we could find no constant relation of the KCNS content of the saliva to the susceptibility of the teeth to caries. From my experience with the subject, I can only concur with the findings of Gies and Kahn, who consider the sulfocyanates in the saliva but an excretion of the products of protein metabolism, and of no apparent value to the mouth economy.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

PROCEEDINGS OF SOCIETIES.

CONNECTICUT STATE DENTAL ASSOCIATION.

Fiftieth Annual Convention, held at Hartford, Conn., April 21 to 23, 1914.

TUESDAY—*Morning Session.*

THE fiftieth annual meeting of the Connecticut State Dental Association was called to order at 11 o'clock, Tuesday morning, April 21, 1914, by the president, Dr. James McManus, Hartford, in the Foot Guard Armory, Hartford, Conn.

Before the business of the session was taken up, Dr. E. S. Gaylord, on behalf of the members of the society, presented to the president, Dr. McManus, a handsomely engraved gavel as a memento of the fiftieth anniversary meeting of the Connecticut State Dental Association.

Report of the Committee on Necrology.

After the transaction of some routine business,

The next order of business was the report of the Committee on Necrology, which was presented by the chairman, Dr. E. S. GAYLORD, as follows:

Your Committee on Necrology report that, since the annual meeting of 1913, three members of the Connecticut State Dental Association have passed away, namely, Dr. Frederick T. Murlless, Dr. John N. Welles, and Dr. George L. Hurd.

Dr. FREDERICK T. MURLLESS died February 11, 1914, age eighty-two years. Dr. Murlless was born in England in 1832. At the age of five years he with his parents came to America, and in 1861 located at Windsor Locks, Conn., where he resided continuously until his death. Dr. Murlless was a man of rather retiring disposition, which in a degree seemed to hold him aloof from active participation in the affairs of his profession. It was the writer's good fortune to come into somewhat intimate relations with Dr. Murlless, which enables him to give testimony to his ardent and intense interest in the steady progressive tendencies of his profession, enlisting himself in the operative and prosthetic branches to such an extent that he was able to produce rare specimens of artistic handiwork excelled by very few operators of his day. Failing health some five years ago compelled him to relinquish active service, to the great loss and regret of a *clientèle* of many years' association.

Dr. Murlless was one of the early members of the Connecticut Valley Association, his election bearing the date of 1865, retaining his membership on the merging of the Connecticut Valley in the Northeastern Dental Association, and continuing active membership until his death. He was also one of the early and valued members of this association and of the Hartford Dental Club. Dr. Murlless is survived by his wife and a son, Dr. Frederick T. Murlless, Jr., honored ex-president of this association and also of the Northeastern Dental Association.

Dr. JOHN N. WELLES died March 1, 1914, age sixty-two years. Dr. Welles was born in Wethersfield in 1852. In January 1901 he married Mary E. Coleman, who survives him. Dr. Welles was a student in the office of Dr. Hitchcock of Hartford, and registered in this state in 1883. In 1888 he opened an office in the old State Bank Building, Hartford, continuing active practice until his health failed, about four months prior to his death. He was for many years a member of this association, also member of the Hartford Dental Club, member of the Jeremiah Wadsworth branch S. A. R. and Wethersfield Congregational Church.

Dr. GEORGE L. HURD died March 3, 1914, age fifty-three years. Dr. Hurd was born in

Adams, Mass., in 1860. He attended high school at Lee, Mass., and received his D.D.S. degree at the University of Pennsylvania in 1882. About thirty years ago he established himself in Lakeville, Conn., continuing until six years ago, when, his health failing, he was obliged to abandon a large and lucrative practice. Dr. Hurd was elected to membership in this association in 1900, continuing a member until his death. His social relations among the people about him were of the highest character, and so uncompromisingly did he maintain what he considered the best interests of his chosen home-town that the present high standard of the community life is due in a large measure to his influence and labor. Dr. Hurd devoted much of his leisure time to the collection of antique furniture and bric-à-brac, attaining the position of an authority among admirers and collectors. He was an active church worker, and for many years in connection with his church conducted a large Bible-class for men. In 1882 he married Grace E. Saunders, who survives him.

Dr. Sears moved that the report be accepted and placed on file. (Motion carried.)

The vice-president, Dr. Charles H. Riggs, Hartford, was called to the chair, and the president, Dr. James McManus, Hartford, read his annual address, as follows:

President's Address.

By James McManus, D.D.S., Hartford.

In the year 1800 three foreign dentists were practicing in Philadelphia, Drs. Lemaire and Gardette, Frenchmen, and Dr. Hudson, an Irishman. They were educated, talented and skilful, successful business men, and gained respect and social recognition. They set a standard calling for general intelligence, special knowledge, and manipulative ability that raised the practice of dentistry to a humane and artistic level.

EARLY AMERICAN DENTISTRY.

Dentistry in those days did not appeal as an alluring calling, and medical men gave little atttention to the value and importance of a clean, healthy mouth and sound, well-articulated teeth. The mouth, the gateway of life, through which pure air and all food and drink must pass to nourish blood, bone, and muscles, was to them only a lodging-place for the tongue, which they did favor with a passing glance. Generally they had little time or respect for a dentist, for, like the surgeons of old, the dentist used hands and fingers skilfully, and in their opinion the dentist was useful only when they or their patients were suffering from toothache and they could not or dared not attempt to give relief.

The best of the early dentists were fine mechanics, who gained what instruction they could as office students. They were quick in acquiring skill as operators, and in inventing new and improved instruments and appliances, and their success in making natural-appearing porcelain teeth set on gold plate, so that they were worn comfortably and gave good service, gained for mechanical dentists the rank of artists. Medical books gave little information on disease of the mouth and teeth, and dental books were scarce. Occasionally articles appeared in medical journals and newspapers that treated of mouth, teeth, and throat troubles, written by dentists who wanted the public to know that they were intelligently treating such conditions. A few medical men saw the inevitable; dentistry was encroaching on the domain of medicine, with less hours of exacting labor, less responsibility, and fair remuneration—and dentistry tipped the scales. Men in both callings began to fraternize; dental societies were organized, and a dental journal was established.

FOUNDATION OF THE BALTIMORE COLLEGE OF DENTAL SURGERY.

That future dentists might acquire an education such as medical colleges were supposed to give, a committee of dentists in 1839 petitioned the trustees, faculty, and managers of the University of Maryland for a dental department. The petition was refused, with the broad intimation that to practice dentistry such

an education was not necessary. What was intended as a knockout gave new life and energy to these men; they now moved on to the legislature of Maryland, and gained a charter for the Baltimore College of Dental Surgery, which opened its doors for students, and conferred for the first time, by the authority of the state of Maryland, the degree of Doctor of Dental Surgery. With a growing literature and books on technical instruction, dental journals, and society organizations, dentistry gained standing and rank in 1840 as the American profession.

Maryland's official seal of approval, society organizations, and a professional journal each gave a rebuke to the managers of the university and its medical advisers for refusing the petition to add an educational dental school to its medical department.

CONNECTICUT'S ROLL OF DENTAL HONOR MEN.

Wells and H. Hayden. Connecticut has to its credit the publication, as early as 1838, of a treatise on "The Teeth, Their Formation, Diseases, and Care," by Dr. Horace Wells of Hartford. Connecticut's honor place in history dates from the organization of the first dental society, the publication of a dental journal, and the incorporation of the first dental college in the world. The name of Dr. Horace H. Hayden, a native of Hartford county, is written in the records as that of the first president of these organizations, in 1839–40. Four years later, in 1844, the medical profession in Boston were startled by a dentist from Hartford, Conn., who gave a demonstration at the Massachusetts General Hospital of his discovery of anesthesia—the "mastery of pain" by the aid of nitrous oxid. The medical men present refused the great blessing—a free gift to the world—sneering at and scorning the inspired country dentist. They preferred to believe the hopeless statement of the great French surgeon Velpeau, who stated that "To avoid pain under incisions is a chimera no longer pursued by anyone." They banished the messenger who proclaimed God's great blessing, and deprived for years countless sufferers of immunity to pain.

H. Preston. Among the early dentists of the country were inventors and skilled mechanics engaged in many lines of artistic work. They were studious and observing, took an active interest in town and city affairs, held local offices, several held high military rank and were members of the governor's staff, and there were several who were at times members of the state legislature. Connecticut has a long list of such dentists to her credit. Connecticut also had several authors and teachers of dentistry, one specially deserving of mention, namely, Dr. Hiram Preston, who practiced in Hartford as early as 1847. He wrote a series of articles for daily newspapers on the care of the teeth that were published in book form in 1848 with this announcement: "This little work is respectfully dedicated to that portion of the community who think." The recommendation of twenty-one of the leading physicians and surgeons of Hartford and vicinity, in 1857, tells of their respect for Dr. Preston and their confidence in his ability as a teacher of dentistry:

> Having employed the professional services of Hiram Preston, dentist, of this city, and being well acquainted with his skill as a practical operator, we believe him qualified to give instructions to those who wish to become masters in every department of this important but nice and difficult art.

This brief English diploma surpasses university parchments phrased in purest Latin and given to students on their graduation.

ORGANIZATION OF THE CONNECTICUT STATE DENTAL SOCIETY.

Connecticut was a training-school for dentists previous to and early in 1800, and many of these men later located in other states, where they took an active part in society, literary, and educational work. And yet it was twenty-five years

after societies and colleges were doing good work in other states, and twenty-one years after Dr. Horace Wells demonstrated his discovery of anesthesia in Hartford, before any move was made to organize a state dental association.

In response to a circular inviting attendance, thirty-nine dentists gathered in Central Hall, Hartford, fifty years ago, and there and then this association was organized by the election of Dr. Asa Hill of Norwalk, Conn., as president. Dr. Hill was well known throughout the country as the inventor of Hill's stopping; he was associate editor of the *People's Dental Journal* of Chicago, a contributor to professional and literary papers, and an ex-member of the Connecticut state legislature. The keynote of his opening address was this sentence—"Let us resolutely purpose that this society shall be a model one of its kind, lacking no element that can either ennoble the profession or bless the community where we live."

ESTABLISHMENT OF HARVARD DENTAL SCHOOL. NO DENTAL EDUCATION AT YALE.

Dr. Hill, in an address delivered forty-eight years ago, in 1866, suggested to the association the advisability of asking the state medical society and the corporation of Yale College to add to its medical school a dental department. A committee was appointed to wait on the medical society, then in session in Hartford, and an appeal had been sent to the college management. Dr. Hill believed that university medical and dental educational facilities must surely come, and wanted Connecticut and Yale to be the first to open such a dental school. The Yale management decided to make no change in its educational course, and a few months later the Harvard College management gave notice to this country and to the world that they had established a department that was open for the reception of dental students. Nearly all the universities of this country have followed the lead of Harvard, graduating yearly hundreds of dental students. If the Yale College medical course, during the past forty years, has included at any time lectures on dental development and diseases incident to dentition, the prevention of mouth-breathing, dental irregularities, adenoids, decay of the teeth, diseases of the gums and mouth, and the serious and painful conditions often caused by retarded eruption of third molars, by a competent dental lecturer, it has not been generally known. That Yale College did not wish to lead in establishing a dental department was unfortunate for the college, but it is infinitely worse, speaking mildly, to graduate doctors all these past years without giving them the benefit of such an education.

SCIENTIFIC WORK OF THE CONNECTICUT STATE DENTAL SOCIETY.

The association "grew and waxed in wisdom." Each year the best teachers available were secured to instruct and give demonstrations, followed by lectures, essays, and exhibits that were thoroughly enjoyable. One was sure to see at the meetings one or more well-known skilful operators and mechanical artists from other states who were glad to be with us and give freely the best that was known to them as specialists.

I believe this association was the first to arrange for a long evening's session under the guidance of two expert microscopists, at the New London meeting, held on October 3, 1865. Prof. J. H. McQuillen of the Philadelphia Dental College, and Dr. Wm. H. Atkinson of New York City, brought with them high-power microscopes and a large number of sections, which they exhibited and explained as an introduction to the lecture to be given the next day by Prof. McQuillen on the "Microscopy of the Dental Tissues," which was followed by an interesting talk by Dr. Atkinson. It was a novel experience, as few of the members had ever seen a microscope or had an opportunity to see or hear such an instructive illustrated lecture.

The meetings, lectures, essays, and discussion were generally reported in the

Dental Cosmos. The change socially that called cold, distant strangers into close comradeship and still warmer friendship, which the second generation are happily enjoying here today, shows that the aim and efforts of the officers of this association through the years that have passed have been to follow the advice of the first president, Dr. Hill—"To make this association a model one of its kind," and they and the members have literally done so.

DENTAL LAWS IN CONNECTICUT.

Connecticut dentists did not ask for state legislation until after a large number of these states had passed restrictive laws, leaving Connecticut outside the circle—an open, free, and attractive state for anyone calling himself a dentist to make his home! A law was finally presented to the legislature, and as no one appeared to offer any objections before the legislative committee, the bill was reported favorably, passed, signed by Governor Morris, and went into effect on May 25, 1893. Since then all who have received from the board of dental commissioners a license stand equally certified before the public as educated and skilful practitioners of dentistry. Unfortunately there have been several applicants for a license during the past twenty-one years that have failed to pass the board, and there are a few working as assistants who do not wish to submit to an examination. That so many have received a license is evidence that the board has not been overly exacting. The unsuccessful applicants for several years have employed legal talent and lobby agents to appear at legislative sessions, and to secure for them—ignoring existing law and dental commissioners—a permit to practice legally. The same amount of time and energy spent in reviewing their studies and perfecting their mechanical work would surely result in securing a license from the board—at a good saving of time, money, and self-respect.

Medical men, members of health boards, school boards, and members of the legal profession, who so jealously guard admission to their own ranks, ought to know and realize that the members of the Connecticut Dental Association and the state board of commissioners, since 1893, have unitedly, earnestly, and unselfishly endeavored to safeguard, protect, and secure for the community in which they live competent dental practitioners.

It has been disheartening during past legislative sessions to watch the class of men who have loitered about the state capitol, striving to influence legislators to undo the good work of past years. They have forced the dental commissioners, members of the State Association, and individual dentists to waste a great deal of time and spend a large sum of money to prevent their discrediting the commissioners, repealing or changing the law, and smirching the character and fair name of Connecticut before the entire country.

A large majority of the members of the legislature no doubt mean to do right by the public, and, if they are given facts and full information, will gladly do so. A few minutes' conversation between the resident dentist and the members from his district before the legislature convenes will prepare them to meet any project that may be presented with a knowledge of both sides, and with the realization that the dental commissioners who have been on duty for years are working for the good of all.

ORAL HYGIENE. THE HARTFORD DENTAL INFIRMARY.

Connecticut civic authorities, charity boards, and the many generous contributors to hospitals, give little thought or attention to the large number of very poor children and adults who suffer torments from preventable diseases caused by defective and diseased teeth and gums. "That hell of all diseases—toothache"—that even philosophers cannot endure patiently, working men, women, and children must endure while earning the wages sadly needed, in order to keep their situation, and delicate, suffering

children, totally unfit to study, are expected to learn their lessons, for failure means a lower grade, and too often discontinuance of school attendance.

All cities and towns should have a dental infirmary, where all sufferers from dental troubles may hope to obtain quick relief from pain, to have teeth extracted, and surgical operations of the mouth skilfully performed—such infirmaries not to be places for operators to waste their time attempting to save hopeless teeth, not places where people able to pay for services should be cared for, but places where the poor and unfortunate, young and old, will surely obtain treatment and good advice, and be given instruction as to the care of the mouth, the teeth, and the health.

A few of the Hartford dentists for several years past have contributed to pay the expenses of a room for a dental infirmary in the Hartford Dispensary Building. One member of the society is paid a small salary for two hours' service each working day; another dentist, an extracting specialist, has been in attendance for two hours or more one day each week, without compensation, and another is a member of the dispensary board of directors, and a general supervisor of the dental infirmary.

This prosperous and wealthy city of over one hundred thousand inhabitants has allowed, I might say has forced, a very few dentists to give their time and money to carry on this much-needed work. They have, so far, been willing and anxious to do their part, but it is getting to be a serious question whether they can continue to work without public assistance. Many residents of this and other cities on good authority believe that not a few hospitals are financially recklessly and wastefully managed, while from the generous contributions given to the hospitals each year a small portion might be judiciously diverted to pay the expense of a dental infirmary, with little danger of extravagant or wasteful management, and a certainty that many sufferers would be made comfortable and happy.

THE DENTAL RELIEF FUND, AND THE TARDINESS OF THE DENTAL PROFESSION IN SUPPORTING IT.

Only a few of the many prosperous dentists of the country during the past year responded to the appeal for the establishing of a relief fund. A seal was designed and put on sale in December last, with the hope that the Christmas spirit would prompt a generous use, and liberal purchase by dentists and their friends of these stamps—to be put on their Christmas letters and packages. The committee thought the dental supply houses would sell or use a large number; with a few exceptions, they were disappointed. They sent packages with one hundred seals to hundreds of dentists, feeling sure that they would get back one dollar if not more for each package; again they were disappointed, and again convinced that dentists are rarely influenced to give to charity through printed appeals.

The dental journals were very liberal in giving space telling that an effort was being made to raise a relief fund. This publicity gave hope to many unfortunate ones, for before money was received from contributions or the sale of seals, letters were received with their sad and pitiful stories of pressing want, pleading to have the writers' names placed on the list of those to be cared for.

A few were hopeful during the month of December that the dentists of the country were going to gain a new record as charitable men. But as few of the estimated forty thousand dentists contributed to the fund or bought liberally of the Christmas seals, the report of the relief committee to the National Dental Association must be a disheartening one.

Again Connecticut's record will stand first. Hartford gave in October last \$151; New Haven \$50; New London \$25, and the Northeastern meeting in Hartford, held in the same month, yielded \$500—in all, \$726 as a start for the relief fund. The other states have been slow. "Pity 'tis 'tis true!"

THE PROSPECTIVE PANAMA-PACIFIC DENTAL CONGRESS.

As you all know, the dentists of the Pacific coast have been making for several months past extensive preparations for holding a Panama-Pacific Dental Congress, to open in San Francisco, Cal., in August 1915. The local committee, after others had declined, asked me to act as chairman of a committee to represent Connecticut at and to work for the success of the congress, which they expect will bring the largest gathering of dentists and be the most important, from a professional, scientific, and educational viewpoint—with the most complete collection of dental and allied exhibits ever offered for the inspection of dentists. From personal experience at the Chicago and St. Louis gatherings, I feel sure that all who attended them were satisfied that the time and money expended was a good investment, yielding, what is more, many life-long, pleasant memories.

Circular letters giving definite information as to headquarters, transportation, etc., will soon be ready for distribution. The following have been appointed members of the Connecticut committee—Drs. E. S. Gaylord, New Haven; A. J. Cutting, Southington; W. J. Beecher, Waterbury, and B. A. Sears, Hartford, recording secretary.

The wonderful scenery and many places of interest on the several routes to and from California, the many attractions and assured hearty welcome, ought to tempt many from this state to become members, and if possible to attend the congress.

EARLY CONNECTICUT DENTISTS.

The story of the advancement of dentistry from an artistic calling or trade to a rank with the liberal professions is a brief one, telling in part of the life-work of two dentists, natives of Connecticut, who practiced, the one in Baltimore, the other in New York City, previous to 1840. One of these was Horace H. Hayden, M.D., known as the "Father of the American Society of Dental Surgeons" and as one of the founders and the first president of the Baltimore College of Dental Surgery, the first dental college in the world. A memorial to his memory, with tablet and lamp, has been placed on land given by the Rev. W. B. Carey in Windsor, Conn.

The other was Solyman Brown, a dentist with many titles—A.M., D.D., M.D., D.D.S.—and many talents; the recording secretary of the first American Dental Society and publisher and managing editor of the *American Journal of Dental Science,* the first dental journal. The influence of these two men as writers and teachers quickly gained a following among the studious dentists of the country, and societies were soon organized, and colleges gained students.

There were a number of good dentists in Connecticut before 1864, but they were content to pursue the even tenor of their way, which was a very slow and a very unsociable one. There were two practicing in Hartford, however, who stand pre-eminent in my mind—Dr. Horace Wells, the discoverer of anesthesia and Dr. Hiram Preston, a most successful teacher and an all-round skilful operator and mechanical worker. My story, however, relates to this association and some of its early members.

EARLY MEMBERS OF THE CONNECTICUT STATE DENTAL SOCIETY.

Dr. Asa Hill of Norwalk, the first president, was in touch with Drs. Hayden, Harris, Brown, Parmly, and the other leading men of the country. He was an educated gentleman, a skilful dentist, and an inventor. The older dentists today believe that the manufacture of Hill's stopping, his most valuable invention, is one of the lost arts. He was an associate editor of two dental journals, a frequent contributor to magazines and newspapers, and a member of the state legislature.

Dr. E. E. Crofoot, treasurer, of Hartford, was known as one of the most skilful and artistic mechanical workmen of his day. He made a specialty of carved

block gum teeth, and the way in which he mounted them on gold plate with a band was equal to the Tiffany metal work of today.

Dr. John M. Riggs of Hartford is known as the associate of Dr. Horace Wells of Hartford, in the demonstration of the "mastery of pain" by the use of nitrous oxid; also for his treatment of what was called for a time "Riggs' disease," now known as pyorrhea alveolaris.

Dr. LeRoy D. Pelton was one of the young signers of the call for the meeting to organize this association. Isaac Woolworth, M.D., of New Haven, the first member of this association, was a medical graduate, a fine writer, speaker, and dentist, and an enthusiastic, earnest member. Dr. John T. Metcalf, one of the best gold contour operators of his day, and Dr. Joseph H. Smith were also fine operators and mechanical workmen. Dr. J. A. Pelton and General Chas. P. Graham of Middletown, Drs. R. W. Brown and W. W. Sheffield of New London, W. J. Rider of Danbury and R. C. Durham of New Britain—all had seen years of service previous to 1864, and were active workers for the advancement of this association.

Two members of later years who ranked with the best among dentists and as leaders, were earnest, thoughtful and loyal members, always anxious for the uplift of the association, and ungrudgingly generous in contributing to its support, were Drs. C. C. Barker of Meriden, and Civilion Fones of Bridgeport. These men, during their professional life, "did live up to the highest ideals."

Three times in the history of this association has the public, professional, and scientific world been specially attracted to Hartford: First, by the placing in 1874 of a portrait bronze statue in Bushnell Park of Dr. Horace Wells, the discoverer of modern anesthesia. Second, by the placing in 1894 of a memorial bronze tablet on the building at the corner of Main and Asylum sts., commemorating the fiftieth anniversary of the discovery of anesthesia. Third, by the erection of a memorial with bronze tablet and lamp to the memory of Dr. Horace H. Hayden at Windsor, Conn., the "Father of American Professional Dentistry." The past fifty years lingers —a memory!

PROGRAM OF THE MEETING.

This afternoon we are to hear and consider the question, "Are we maintaining our highest ideals?" A glance over your program will assure you that your committee have been fortunate in securing essayists of a high order of scientific knowledge and professional ability to give you the benefit of their ripe experience as specialists in the practice of dentistry. They have done more; they have invited the public, with you, to be present in Unity Hall tonight, to see demonstrated and to hear what professional dentists have been doing and are doing to limit and prevent the spread of disease.

Dr. Wm. A. White of Phelps, N. Y., lecturer, and member of the New York State Board of Health, will lecture on "Oral Hygiene," showing one hundred stereopticon views; and Thomas Darlington, M.D., for years health officer of the city of New York, now secretary of the American Iron and Steel Institute, will lecture on "Welfare Work in Industry," showing over one hundred picture illustrations. Surely the program for these sessions tells that your committee were not unmindful of the advice given by Dr. Hill fifty years ago: "Let us absolutely purpose that this society shall be a model one of its kind, lacking no element that can ennoble the profession or bless the community where we live."

Dr. Erbe moved that the address of the President be received and placed on record. (Motion carried.)

Report of the Legislative Committee.

The next order of business was the report of the Legislative Committee, by Dr. A. C. Fones, chairman, as follows:

Mr. President and Members of the Connecticut State Dental Association,—Your Com-

mittee on Dental Legislation have gone over the proposition for a new dental law for the State of Connecticut, and we find that although there are some good features in our present law, yet we need really to "move up" into the twentieth century.

There are many additions needed to our law, also some subtractions and alterations. It is a tedious piece of work to formulate a dental law and go over all the new laws of the states of the Union and get the meat out of these and compile it and adapt it so as to get what we want for our own state.

We feel that some of the following things should be brought about:

That the name Dental Examiners would be better than the present name. That the members of the board be appointed to serve five years, with the privilege of one re-appointment. The object of this is to avoid making it a life position, as has been the case in some states; although that has not been the condition in our state, we feel that it would be better to avoid such a possibility.

Then: Removal of members of the board for cause by the governor. There is at present no provision for the removal of members of the board for cause.

Define "reputable dental colleges"; define a standard of "preliminary education."

Standardization of certificates of licensed and unlicensed assistants.

Annual registration, with a fee of one dollar. We feel that one of the strongest features of the new law should be that every dentist should be compelled to register every year with a fee of one dollar for registration, this fee to go into a prosecuting fund to be at the disposal of the State Association to see that the law is enforced throughout the state. That every year this list should be published and sent to every qualified practitioner in the state. This would indicate that if there was a man practicing in your locality who was not on this list, he would be practicing illegally and might be prosecuted at once. This we feel would be an admirable method to keep up with illegal practitioners, and this sum—possibly in the neighborhood of six or seven hundred dollars—would be of considerable aid in having investigations made by the state authorities.

We feel also that the law should define "dental practice," and provide for the elimination of corporation names and signs over the doors of offices. We believe that it should be compulsory for everyone practicing to have his name on the outside of the door. The law should also define the standing of unlicensed assistants, and their limitations regarding ownership of offices, etc.

There are many details to be worked out, but these in general are the points we have considered in trying to formulate a new law. It will be this fall before it is completed, and it will be submitted, if it is your wish, to the members of the association for approval or disapproval, comments or suggestions, or they may write their suggestions to the committee and thus have desirable changes incorporated in the law before it is presented to the legislature, which will be next January.

Dr. HENRY MCMANUS. I move you, Mr. President, that the society accept with thanks the report of the Legislative Committee, and extend to the committee its confidence in their ability, integrity, and industry, and that the society instruct the committee to take any and all action that may in their opinion seem wise and proper to put the body of the report into effective operation as a law.

The motion was seconded by Dr. GANUNG, and carried.

The Secretary read a telegram of greeting from the president of the National Dental Association, Dr. H. C. Brown, Columbus, Ohio.

Motion was made and carried to adjourn until the afternoon session.

(To be continued.)

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held March 28, 1914.

At the regular monthly meeting of the Academy of Stomatology a paper was read by Dr. R. W. Bunting, Ann Arbor, Mich., entitled "Potassium Sulfocyanate in the Saliva."

[This paper is printed in full at page 838 of the present issue of the Cosmos.]

Discussion.

Dr. Wm. J. Gies, New York. It has given me very great pleasure to accept your invitation to be your guest tonight, and to discuss Dr. Bunting's paper. I note that Dr. Bunting concedes that the Rupp, Schied, and Thiel iodometric method "is the most accurate quantitative test which we have at our command," thus excluding his own method from adoption except for "clinical" uses. I am glad to hear, also, that Dr. Bunting indorses recent findings to the effect that sulfocyanate is presumably a waste product of protein metabolism and that it has "no apparent value to the mouth economy." It is necessary to conclude, in the light of these admissions, that we are devoting the evening to considerations of little interest and also of no importance for the future of dentistry. We are dealing, as Dr. Bunting indicates, with a dead issue.

At my request Dr. Bunting sent me several weeks ago a copy of his paper, which I have read very carefully. After doing so I felt that Dr. Bunting was, in effect, exhuming a corpse, trying to dress it up as attractively as possible, and insisting on having another funeral. The general trend of Dr. Bunting's argument reminded me, also, of the case of the lawyer who stated to a court, one morning, that he wished to give seventeen reasons for the failure of his client to appear for trial. The court listened very patiently to one long statement after another, until finally the lawyer announced the seventeenth reason—his client was dead! It was the opinion of the court that, under the circumstances, a statement of the seventeenth reason without explanation would have been sufficient.

In view of the fact that there is a serious defect of logic in Dr. Bunting's deductions, I am going to begin with that—my "seventeenth reason" for concluding that his method is deficient.

The main point in my criticism is that Dr. Bunting has not proved by any experimental procedure that his new method is more delicate quantitatively than the conventional ferric chlorid process; he has merely indicated that the colorations obtained with his new method are more striking in some proportions—"more vivid"—than those observed with the ferric chlorid test as commonly applied. He has not shown that any given proportion of sulfocyanate which could not be detected by the conventional process would be revealed by his new method, which is the heart of the matter. He seems to have deluded himself into thinking that because the colorations obtained with his new process are, in certain selected proportions, more intense than those for the same selected proportions with the conventional ferric chlorid test, the new method itself is more distinct, therefore more accurate, and consequently more useful. If he had followed these comparative colorations step by step to their vanishing points for each test, with adequate controls, he would have avoided this fallacy in his claims.

Dr. Bunting has not shown you what happens when the alcohol-ether solution

is placed on a watch-glass with nothing else there except the prescribed drop or two of ferric chlorid solution. If a drop of ferric chlorid solution is spread upon a clean watch-glass, entirely free from sulfocyanate, and then alcohol-ether mixture is added, as directed by Dr. Bunting, ferric chlorid is dissolved and a deep yellow solution results. If Dr. Bunting ever noted this fact he has said nothing about it. It should have been demonstrated tonight, with the other phenomena shown, and its influence as a confusing factor duly taken into account! Has he mistaken this at any point for sulfocyanate coloration?

In his demonstrations, Dr. Bunting has shown coloration effects with large proportions of sulfocyanate—why not with the small proportions that usually occur in saliva? You have thus been given an exaggerated impression of the value of the test. We are rarely in a quandary when testing for large proportions of a substance; that is usually easy, even with a very crude method. To amount to much a chemical test should show the presence of *traces* of a substance. With the aid of the conventional ferric chlorid process, it is not at all difficult to detect 1 part of sulfocyanate —potassium salt, Kahlbaum preparation —in 4,000,000 parts of water. Neither Mr. W. A. Perlzweig, one of my biochemical associates, nor I have been able to do so with Dr. Bunting's process. Dr. Bunting himself claims that "by careful technique a distinct color [the yellow of ferric chlorid?] may be obtained from a solution which contains 0.0001 per cent.—1 part in 1,000,000—of KCNS." Our comparative tests with saliva have given us equally striking differences in favor of the conventional method. All our tests were suitably "controlled," of course, and very slight though insignificant differences in color were easily observed as a consequence.

Briefly then, Dr. Bunting has not shown you that his new method will reveal proportions of sulfocyanate in watery solutions that cannot be detected with the conventional method. He has also failed to prove that his new method shows proportions of sulfocyanate in saliva that cannot be revealed by the conventional ferric chlorid process. Why, then, all this proposed use of expensive alcohol and ether? Furthermore, since the conventional ferric chlorid method itself is concededly unreliable for quantitative work, why waste time on either method?

I have already stated my seventeenth reason for concluding that this case is a closed one, and I ought to refrain, perhaps, from proceeding with any of the remaining sixteen reasons; yet a few additional points may serve to emphasize the causes of my dissenting remarks in this discussion.

Dr. Bunting's method is very crude, and his manipulation of it was singularly lacking in chemical understanding and precision. Speaking of the latter point first, let me remind you of the fact that, in one of his demonstrations, after mixing a residue on a watch-glass with ferric chlorid solution, Dr. Bunting tilted the watch-glass, and, by several effective jerks, threw to the floor some of the excess of watery fluid—including sulfocyanate and ferric chlorid in solution!—prior to adding the alcohol-ether mixture, evidently on the assumption that the excess of water in the ferric chlorid solution being detrimental to the test—and demonstration—it was desirable to get rid of the water mechanically. A quantitative chemical demonstration, too!

Dr. Bunting's method is very crude, as I have said, because it involves the wide dispersion of a comparatively volatile liquid on an exposed watch-glass, thus inducing unequal concentrations, by evaporation, of the volumes of the carrier of the colored substance and introducing unnecessary error in all quantitative tinctorial comparisons. Such a method should be conducted, in its extraction phases, in a closed vessel.

Dr. Bunting's technique is conducted so crudely that he recommends the following expedient to prevent the disturbing influence of "some colloidal iron compound in combination with the mucins of the saliva:" "The formation of

this compound may be almost entirely eliminated if instead of stirring the ferric chlorid into the dried film of saliva it be *lightly smeared over the surface* and allowed to stand for a minute or two until the reaction is complete before pouring on the alcohol-ether." How does he know that the reaction with sulfocyanate is ever complete under these conditions? But, if it ever is completed, what prevents the simultaneous completion of the disturbing reaction which he seeks to avoid?

It is interesting to note that Dr. Bunting says nothing in his paper about the disturbing influence of diacetic acid, which was a strong contention, in fact one of the most important considerations, in his first paper on this subject. He was trying in his earlier work to find a way of determining accurately the sulfocyanate in saliva, but he concluded, from certain variations in the responses to the test, that the main disturbing factor, perhaps the primary cause of deficiency in the conventional sulfocyanate test, was diacetic acid. Does diacetic acid affect his new procedure? If so, is the disturbing effect more or less than that on his first process? Possibly any contained diacetate would be decomposed by the preliminary desiccation. What is the precise effect on his new process of the various substances in saliva that often disturb the conventional test? He shows nothing on these important points.

Dr. Bunting said: "It seemed very strange that when we used ferric chlorid in the urine we called the substance which gave a red reaction aceto-acetic acid, and when we used the same reagent in the saliva and obtained a red color we said that it was due to KCNS." This will be news to chemists. In this, also, Dr. Bunting indicates unmistakably that he is trying to deal with chemical facts without taking the trouble to inform himself of their significance. The ferric chlorid tests for diacetic acid and sulfocyanate are different. When ferric chlorid solution is added to urine, a positive color response is only half the test for diacetic acid, for, if another portion of the same specimen of urine fails, after being thoroughly boiled, to yield the typical coloration with ferric chlorid or a coloration of appreciably lower intensity—due to the conversion of diacetic acid to non-reactive acetone—the test is *presumably positive* for diacetic acid. Even with this precaution the test is unreliable; then, too, the ferric chlorid test, as applied to saliva, is preceded by acidification with hydrochloric acid, which prevents reaction with any contained diacetic acid. Besides, this old test—Gerhardt, 1865—while bearing on the ancient history of biochemistry, cannot be compared in efficiency with the tests now in routine use in the biochemical laboratory for the estimation of diacetic acid.

Dr. Bunting alludes to the mucin of saliva as a disturbing factor in his process, but says nothing about salivary phosphate in the same relation, although the latter may be quantitatively more influential than the former. He refers to other confusing factors, such as acidity and a deficiency of ferric chlorid, without indicating their full import in the application of the method. May not the absence of acid favor undesirable reaction with diacetic acid—if the latter is not decomposed during the desiccation process—and other special substances? He ignores this possibility. He says that "by careful technique a distinct color may be obtained from a solution which contains 0.0001 per cent. KCNS." Was it the color of ferric chlorid? He seems to have made no control tests to determine this point.

Dr. Bunting alludes to his standard colors without stating how he managed to keep them at their original intensity. A fading color is a poor tinctorial standard.

It is interesting to note that Dr. Bunting says nothing about tests for sulfocyanate in saliva in concentrations greater than 0.009 per cent.—1 in 11,111—a comparatively large proportion for saliva, and which may be very readily detected with the old method, although referring to his tests for sulfocyanate in aqueous solution, he said he could detect 1 part in 1,000,000 of water —0.0001 per cent.

Dr. Bunting's references to his six points of interest in the application of the test to saliva are sufficient to show that the test is not reliable for accurate work.

The variability and unreliability of the results, when Dr. Bunting's new method is applied to saliva, are effectively set forth by Dr. Bunting himself in the following statement:

According to the foregoing method, a large number of salivas were tested by the author. In these tests, it was seen that in the alcohol-ether solution many salivas gave a resultant red color which was much stronger than that in the water solution, the color obtained being approximately equal to the alcohol-ether equivalent of the water reaction. There were, however, many cases in which the alcohol-ether color obtained was no stronger than that of the water solution, and in other cases it was decidedly less. If, as we have seen, KCNS may be detected by the alcohol-ether solution when it is present in the saliva, and if the color thus obtained is stronger than the corresponding water tests, we can but conclude that in those cases in which the proper color is not produced in alcohol-ether, the color seen in the salivary solution is due in part to some substance other than KCNS.

The latter conclusion should have been tested—otherwise it is mere speculation.

After learning what Dr. Bunting said in the quotation immediately preceding, one wonders how he could allow his high regard for his proposed method to blind him to the humor in the series of *non sequiturs* in the following further quotation from the paper he has just read:

Anyone who will carefully carry out the method as suggested, upon a number of different salivas, will recognize the discrepancy between the alcohol-ether and the water tests, and will be convinced of the unreliability of the latter. The alcohol-ether test does not specify the nature of the interfering substance, and indeed the name of its class may be Legion, nor does it eliminate all such compounds, for many of the benzoates, acetates, and other substances are soluble in ether. But, imperfect as it may be, the alcohol-ether test indicates KCNS when it is present. The failure of the ordinary water test to check with that of the alcohol-ether very clearly indicates a multiple reaction [?] which cannot be looked upon as a true index to the KCNS content.

Some of Dr. Bunting's statements here tonight confirm the essentials of our criticism of his first proposals on this general subject. None of his remarks correct any of the points we made, though the manner in which he refers to our criticism might lead to opposite inferences.

We said, for example, that Dr. Bunting believed that as a result of his proposed treatment "ferric sulfocyanate would remain wholly undissociated, and that the ether would extract all of that colored substance from the moistened residue." He did not recognize the fact, however, that his addition of "a drop of water" and of the water in "one or two drops of ferric chlorid solution" prevented such a consummation, by markedly dissociating the ferric sulfocyanate, the sulfocyanate ions being insoluble in ether. We also said that "Bunting has apparently not noted the fact that, if saliva-acid-ferric-chlorid mixtures exhibiting the ordinary positive sulfocyanate reactions of average intensity are shaken with ether, the supernatant ether may fail to acquire a reddish tint, and the intensity of the original color underneath may be very greatly diminished—in some cases to the vanishing point. Ether may render the classical test less delicate than ordinarily. On the other hand, 5 cc. of an etherial solution of ferric sulfocyanate containing a proportion of the colored substance approximately equal to the proportion of sulfocyanate in saliva, when shaken with a few drops of water, loses its color."

In one of his demonstrations tonight you have seen Dr. Bunting show that these statements of ours were assertions of fact. He has also conceded this in his paper. Then, too, by using amyl alcohol—containing ether—instead of ether itself, in his substitute for his first method, Dr. Bunting further emphasizes his appreciation of our remarks on the comparative uselessness of ether for the purpose suggested by him.

Dr. Bunting now explains that a long statement in his first paper, appearing

there as his own expression of opinion, was quoted *verbatim,* without acknowledgment, from a translation of Ostwald's chemistry. We had criticized this assertion in its particular setting, *i.e.* as a statement of *quantitative* relationships pertaining to the use of ether with ferric chlorid, by remarking that "These statements do not seem to be based on experience." Aside from noting the plagiarism to which Dr. Bunting confesses, it is sufficient to add that Ostwald's comment pertained to fairly concentrated solutions under qualitative conditions, not at all to quantitative estimations, and for that reason did not apply to the situation to which Dr. Bunting referred Ostwald's remarks. Experience should have prevented Dr. Bunting from making this error of interpretation in the first place, and certainly should have made it impossible for him to repeat the blunder, as he does in effect tonight.

As he read this part of his paper Dr. Bunting did not seem to think of his intention to show you, as he did in one of his demonstrations, that Ostwald's comment cannot be correctly quoted in support of Dr. Bunting's proposed use of ether for the accurate estimation of sulfocyanate, just as we claimed it could not. Dr. Bunting also seemed to ignore in one part of the paper what he said later:

> In the study of the transferrence of ferric sulfocyanate from water to ether solution . . . absorption by the ether depends upon the concentration of the ferric sulfocyanate, and that above certain concentrations the ether color reaction is stronger than that of the water.

His confusion on this subject is further shown by the following remark, which he read to you from another part of his paper:

> When we shake various solutions of ferric sulfocyanate from water to ether, there is *always* [!] a variable [!] amount of red color remaining in the water solution. But if on the contrary [contrary in what sense?] we concentrate to the smallest possible volume capable of giving a complete reaction between the KCNS and ferric chlorid, the ether solution when poured over [!] will completely dissolve the color from the water, leaving no red color behind.

I am sure this opinion was not quoted from Ostwald's chemistry.

Dr. Bunting says we objected to his suggestion that aceto-acetic acid may be present in some salivas. We said nothing to that effect. The following quotation from our paper shows that Dr. Bunting jumped to an unwarranted conclusion in this regard.

We said: "Bunting ignores in this connection the fact that diacetic acid does not *normally* occur in saliva in detectable amounts. Then, too, while diacetic acid is reactive in aqueous solution, in a way to simulate sulfocyanate, it does not react in this way under the conditions prescribed for the classical test, *i.e.* in the presence of a chemical excess of hydrochloric acid."

Perhaps the most naïve statements in Dr. Bunting's whole paper are these remarks, in allusion to the series of criticisms of his proposed new method:

> It has been curious to note, first the number of different interpretations which may be made of a seemingly clear statement; and second, the difficulties which might be encountered by those attempting the use of the technique suggested. I felt very confident that in my hands the method had been giving me trustworthy results, but in view of the experiences of others, many of whom were learned and able chemists, it seemed worth while that I look further into the basic principles of this test with the view of standardizing the method and estimating its accuracy. . . . . We have, therefore, in the concentration method, brought about a condition in which all of the ferric sulfocyanate may be transferred to the ether solution [he evidently means amyl alcohol containing some ether], and as the color of this salt is more brilliant in ether [!] than in water, we have a resultant color several times stronger than that of the water solution, as is shown in the table given. All of which serves to show the fallacy of the attempt of many investigators to check the method suggested by the process of shaking, as well as their condemnation of the method upon these grounds. [This is not the method "many investigators checked."]

It was not an inability to understand a seemingly clear statement, nor a fail-

ure suitably to interpret that statement, nor any difficulties in using his simple technique, but the impossibility of seeing any real chemistry in Dr. Bunting's data that accounted for the dissent expressed. Even now he does not appear to realize that there was no "fallacy in the attempt of many investigators to check the method by the process of shaking." Principles were established thereby that indicated the invalidity of the process as proposed by Dr. Bunting. It is high time for Dr. Bunting to realize this.

Instead of answering the criticisms published by MacDonald, Pickerill, Kahn, and myself, Dr. Bunting refers to our comment as if it had been pointless; but he proceeds, nevertheless, to substitute a new extractive medium for ether, thus in effect, negatively conceding the essential points in our adverse criticism. Instead of standardizing his old method, he would substitute a new one that is no better.

I presume I have covered most of the additional sixteen reasons, in spite of my purpose to refrain from going any further with this matter than the performance of my scientific duty requires. But I wish to say, in conclusion, what I have said elsewhere of a similar paper: I regard this paper as another of the many pseudo-chemical contributions which dentists have felt free to publish in the name of research. Animated in every case, apparently, by an ardent and commendable aspiration to increase dental knowledge, certain dentists, with misguided zeal and good intentions, have ignored the fact, nevertheless, that chemistry and dentistry are two dissimilar professions which require, in each case, particular technical skill and thorough scientific knowledge for their most successful pursuit. These well-meaning dentists have overlooked the fact that brilliant success in one profession is not an indication of particular capacity in the other. You know that it is very difficult for an expert in either profession—dentistry or chemistry—to be consistently correct in his methods and conclusions, and to avoid inexcusable blunders. How much more difficult it is for the unskilled and inexperienced! It is remarkable to what extent the idea prevails that scientific research is a mere diversion or hobby-riding, in which any one may engage as acceptably as any other, and that special training for the work of investigation is quite superfluous.

Dentists should understand that chemical research cannot be successfully conducted today with methods described in text-books published fifty years ago, or in the light of haphazard experience gained by puttering with chemicals, or simply with good intentions. It is time for you to eye with suspicion the expert dentist who persists in taking your time and using space in your journals to present chemical research of doubtful validity and of dubious comprehension. Let us stick to our lasts! Let us show each other that we have respect enough for the arts and sciences to grant that all of them require for their successful pursuit quite as much knowledge and skill and preoccupation as any in which we are individually engaged.

Chemical problems in dentistry should be attacked by professional chemists. Metallurgical research in dentistry should be largely in the hands of expert metallurgists. So it is with some other branches of dentistry. If trained chemists and metallurgists, for example, do not see your problems, point out your difficulties!—call for help! I believe there are many chemists who would cheerfully respond. Scientific dentistry has advanced slowly in its biological aspects because trained biological investigators have not been attracted to the field, and also because dentists as a body have been content to swallow unlimited quantities of the pseudo-science which members of their own profession have been evolving and have been encouraged to publish. In harmony with this last criticism of mine let me remind you that Dr. Bunting began his paper tonight by telling you that it was "upon a subject which has been completely shelved, and which has little bearing upon the problems of today," and adding that his defense is that he came at the request of

your committee, who asked that he give the results of his recent work upon the subject—that is, upon an avowedly dead issue! But Dr. Bunting also said that he "welcomed the opportunity" to do all this. So did I, but in the spirit of an undertaker!

I publicly stated, recently, to some of your colleagues at a dental meeting in New York, that I have taken the warpath against your pseudo-chemists. I was told in reply that I might never perform a better service for dentistry. I propose to keep the war-paint on until someone knocks me out with a showing that I am wrong in these deductions.

I deeply regret, from the personal standpoint, that I have felt impelled to express myself so fiercely. I wish I might have been able to help to make this a thoroughly enjoyable meeting. I am very sorry that I can see in Dr. Bunting's paper nothing more than abundant evidence of misdirected zeal.

Dr. PERCY R. HOWE, Boston, Mass. There is hardly anything to be said upon the topic of Dr. Bunting's interesting paper that has not been said.

The suggestion that the control of dental caries depends upon the presence or absence of any familiar substance is sufficient to bring it under the closest scrutiny. KCNS has received this. It has been added to cultures of the fermentative micro-organisms that are held responsible for tooth decay, and various methods employed to ascertain if it could be demonstrated that it inhibited bacterial growth, with negative results. In fact, my own work done a number of years ago led me to feel that it slightly stimulated the bacterial life. I have seen it reported that it seemed to supply yeasts and molds with some slight nutritional demands upon the part of these microbic flora. My conclusion was arrived at by estimating the acid formed under similar conditions and a comparison with controls. The point to bring out is that it emphasizes the fact that it does not inhibit the kind of bacterial life that concerns tooth decay.

The physiological chemistry of this salt has been exhaustively treated in the elaborate experiments of Dr. Gies and his staff, and he has shown most conclusively that the substance is excretory, and without effect on bacterial growths. The profession is to be congratulated upon having enlisted the interest and service of Dr. Gies.

As a result of some experiments that I carried out to ascertain if it were possible to take by way of the stomach medicinal substances and find them or their radicals in oxidation and reduction products excreted by the glands into the mouth, as, for example, urotropin causes formaldehyd to appear in the urinary tract, I found KCNS to appear in from fifteen to twenty minutes, and on this account have called it excretory.

Inasmuch as there is nothing from the laboratory to show that it restrained the bacterial flora of the mouth, the possibility that it dissolved, disintegrated, or prevented the formation of the bacterial plaque was suggested, and it was further intimated that it reduced the viscidity of the saliva.

When we recall the fact that these bacterial plaques are either precipitated by the formed acid, as demonstrated by Dr. Kirk, from the organic constituents of the saliva, or else are a mucin directly formed by the microbic life, we would believe it necessary for the agent capable of destroying this coagulum to be a digestive and not a mineral salt.

As to viscidity of the saliva, we do not know whether viscidity is a good characteristic or not. There remains much to be worked out concerning this. It is true that it aids stasis, and that disintegrated or altered it becomes a morbid and pernicious substance, but normally it is without doubt protective of the teeth. Its physical properties prevent many substances injurious to tooth structure from coming into direct contact with the teeth. It holds the crystalloids of the saliva in solution in from two to four times their water solubilities—for example, according to my work, lime as CaO in from 0.011 to 0.015 per cent.—about as in the blood of mammals. Not only this; it withholds them from precipitation in this strength

even after the CO_2 has been all removed according to other analytical work I have carried out in connection with tartar formation. So that we may feel that if KCNS does render the saliva less viscid, we are uncertain whether or not it is for the good of the teeth.

It might almost be reasoned out that KCNS in physiological as opposed to pathological proportions could hardly have the hoped-for properties; for when we consider the methods through which bacterial life is restrained in the system, we can find no analogy between intracellular digestion of invading organisms and their destruction or disposal by an inorganic salt.

There are many more things that might be said against this theory that has arisen about KCNS, but I know of nothing in support of this. Dr. Bunting's test for this substance has received some criticism. I think this is due to not following Dr. Bunting's details. As he has said, the HCl decolorizes the ether. I have tried the test many times, and in my hands the color is much deeper by his ether method than by the FeCl plus H_2O. The selection of a test depends upon the nature of the experiments; for such experiments as are conducted in an ordinary office I believe his test to be a valuable thing. We know that bacteria are very sensitive to their suroundings, and that changes in their culture media produce results that are utilized in distinguishing forms that are identical morphologically and as to certain other characteristics. The fermentation of carbohydrates is one of these standard tests. It has been shown further that pathogenic germs become simply lactic-acid-forming in the presence of utilizable sugar, but that KCNS could induce any such changes in the media that would alter the nature of the bacterial activities cannot be held. So that we are in all fairness bound to exclude this salt in our search for substances that are associated with dental caries.

Dr. C. J. Grieves, Baltimore, Md. I wish to remind you in the first place that I am not here as a chemist. I am here simply as a dentist. Dr. Gies' remarks made me feel peculiar indeed. I felt that we had reached the seventeenth reason, and if we are to be the judges of this matter, we are quite as badly off as the man who listened to the sixteen reasons. The question is, Why have we fiddled with the thing, and why has not somebody told us to stop it long ago? I am not at all able to discuss the question from the chemical standpoint. The saliva proposition is an astonishing one, and as we get into it we find that we cannot go out with so much money and buy so much research at so much per. That has been the *bête noire* of the profession, that when we as dentists go out to get such work as this—and we have been told that we should not fiddle with these ultra-scientific matters—we cannot get men interested, and the question is, How are we going to manage the matter? When we go to the scientist to interest him in our cause, he takes no interest in it, and further, he does not know anything of our specialty. We feel that we must have men who know something about teeth, at least enough to help us in our profession. I for one shall be delighted if we can, as I hope tonight we have from the different efforts of these gentlemen, bury this matter; the question is, Why could it not have been buried by such expert scientists as we have had here tonight, years ago. Why has the discussion been kept up—certainly not by dentists, because few know anything about it. This same type of situation has occurred many times, and is occurring, and I fear is going to occur again. I do not know exactly the status of our medical brethren, whether they know any more chemistry than we do, but I do know in the report from *Collier's* made the other day, with regard to the trying-out of the new laws of eugenics, the state bacteriologist of Wisconsin said that there were about twenty men in Wisconsin who could make a Wasserman. That statement was made by the state bacteriologist of Wisconsin, and I believe the magazine in which it was published is published in New York.

I am serious, however, when I complain of our position. I am at a loss to

know how the dentist is going to get research outside of the profession. I happen to be the secretary of an organization that has been trying to get this, and we have been told that we cannot get it inside the profession, and we need it very much. This question of the saliva and all the things in it is a very perplexing question. It was so comfortable when we had the old idea of food lodging around the teeth and causing decay; that was so easy, but it has fallen down now, and we want help, and I wish Dr. Gies could tell us how we are to get it.

Dr. GIES. I shall gladly answer Dr. Grieves' question, but, before I do so, let me call attention to a fallacy underlying his remarks. Does anyone need to know anything about the teeth in order to determine the presence of sulfocyanate in a liquid? Dr. Bunting has brought before you a strictly chemical proposition —one that is as essentially chemical as the determination of ammonia in urine. The determination of sulfocyanate in a dilute liquid is a chemical project, but the use of the data obtained with the method is another matter; the use of the data may be a dental proposition entirely.

How may dentists obtain the help Dr. Grieves says the profession needs? My answer is, By asking for it where it may be available; also by turning the influence of dental societies to the support of such research as dentists consider desirable and which trained investigators, either as consultants or as prospective workers, believe to be feasible. The First District Dental Society of the State of New York and also the Dental Society of the State of New York followed this plan, I know, and found the biochemists of Columbia University quite willing to drop other work in order that they might be freer to do their best in behalf of dental research, in spite of their regrettable ignorance of the science and art of dentistry when the work was started. You can do indirectly through such agencies what you might not be able to accomplish individually. Andrew Carnegie has made notable contributions to science —through the brains and hands of those who have served the Carnegie Institution of Washington. By all means develop interest in and enthusiasm for research, and do all you can to advance investigation, but do not suppose that your success or interest in dentistry qualifies you, as a matter of course, for expert work in another profession.

Dr. Grieves is mistaken when he says that the sulfocyanate discussion has not been kept up by dentists. He will find practically no literature on this dental subject outside of dental journals. When Dr. Grieves says that the sulfocyanate discussion has not been kept up by dentists because few know anything about it he again makes a mistake—some of the dentists who have been most conspicuous in such discussion have shown a remarkable deficiency of real information about sulfocyanate. The story of the rise and fall of sulfocyanate in dentistry is, in my humble opinion, one of the most typical chapters in the history of pseudoscience.

Dr. GRIEVES. You have decided that sulfocyanate has nothing to do with caries?

Dr. GIES. There is no reason for believing that it has. We have never been able to show anything to warrant such a belief. I do not say it is impossible, because the impossible is very frequently the truth in science.

Dr. GRIEVES. That is a dental matter. We have asked whether sulfocyanate has anything to do with caries, whether it has anything to do with producing or preventing caries, and you have decided that it has not. The point I want to make is to decide very definitely tonight that sulfocyanate has nothing to do with dental caries.

Dr. GIES. Nothing, so far as our knowledge at the present time indicates.

Dr. GRIEVES. That is strictly a dental matter, and yet you say we have no business meddling with these things.

Dr. GIES. On the contrary, I have said that dentists should make the interpretations of available data.

Dr. GRIEVES. My statement is that we are in your hands as to these interpretations, because we do not know enough chemistry to make them.

Dr. Gies. But I have been suggesting right along, and continue to feel, that chemists should be intrusted with the work of ascertaining chemical facts, and that dentists should interpret the bearing of such data on dentistry.

Dr. Grieves. But you have interpreted it tonight to the effect that sulfocyanate has nothing to do with caries.

Dr. Gies. In this I am repeating the interpretations published by dentists. Dr. Bunting, for example, interprets the facts in this way, as he stated tonight. But in this particular instance my interpretation is also based on biochemical data, and I speak, to some degree, as an investigator of nutritional problems—in this case neither as a chemist nor as a dentist. I have studied the sulfocyanate problem experimentally from several standpoints, by nutritional methods that I am sure you would concede were effective. My opinion of the meaning of the biochemical and nutritional data on sulfocyanate is accordingly given from the point of view of the physiologist—your standpoint, too, if, as dentists, you propose liberally to interpret the available data on this particular subject. The biochemist stands between the chemist and dentist on the line between the two subjects.

Dr. Otto Inglis, Philadelphia. I would like to ask a question. I understand that indican is considered symptomatic of intestinal putrefaction. Could potassium sulfocyanate considered as a waste product in the saliva be construed as indicating any malnutritional factor?

Dr. Gies. Sulfocyanate is a normal waste product of protein metabolism, if our present knowledge is correct. It bears no known relation to any condition of malnutrition.

Dr. Bunting (closing the discussion). I have been very much interested in the discussion of my paper, and especially in the elaborate exposition which has been made by Dr. Gies. As my time is limited I shall confine my closing remarks to a reply to Dr. Gies' discussion.

Dr. Gies has called me a body-snatcher, and has accused me of exhuming a corpse for the purpose of holding another funeral. In this regard I would say that I did not like the burial which Dr. Gies gave this subject on a former occasion. The living have something to say as to the manner in which the dead are buried. Dr. Gies summarily dismissed the consideration of this subject which I made some four years ago without giving it just and due consideration, and without understanding the technique as suggested.

I therefore set about the task of checking up the method very carefully, estimating its accuracy and comparing with controls. I used every care to avoid error and double-checked all my results. At my suggestion, my assistant went through all the tests in an independent manner as a further check. I then laid the data before several members of the chemical department of our university, and was assured by them that I was perfectly justified in my claims for the accuracy of the method which I had suggested.

These results I have brought to you tonight, and Dr. Gies tells us that I have not demonstrated that my method is any more reliable than the one that is commonly used. To one who has spent some considerable time in the study of this test, the attitude of Dr. Gies is quite like that of the man who, upon seeing a giraffe for the first time, turned away in disgust, with the remark, "There ain't no such animal!"

By his discussion tonight, Dr. Gies has very clearly shown that his investigations of this subject have been made with his eyes steadfastly closed to the merits of the subject, and his efforts have been spent in the search for unimportant and unmentioned factors which have nothing to do with the real issue of the case. It savors more of that form of research in which the investigator arrives at his conclusions before he begins his problem, and then looks for the data which will prove his contention. Such forms of research are always open to question, and might well have a place among those pseudo-scientific studies to which the doctor refers.

Dr. Gies' first objection is that the

test which I have suggested will not show KCNS in any strength not discernible by the old method. In this he reveals plainly the fact that he has not done the work which he claims to have performed upon this method. Anyone who is familiar with salivary analysis knows full well that in testing for KCNS by the ordinary method it is extremely difficult to determine the exact amount of color present in cases of small percentages. Due to the viscosity of the fluid and the presence of substances which interfere with the passage of light, salivas containing 0.001 per cent. give a color reaction which can be estimated only with great difficulty. As I stated, all such salivas give a color reaction by the alcohol-ether method which is clear and unmistakable, being about three times the strength of the corresponding water equivalent; so that such great dilutions in salivas give a positive reaction by the alcohol-ether method; with the ordinary test they are negative or indeterminate.

The objection that the ferric chlorid alone which was used in making the test might be confused with the reaction of a weak sulfocyanate test is rather wide of the mark. No dilution of ferric chlorid is anything but yellow, and as the color of the ferric thiocyanate is red, the reaction may be clearly recognized even in extremely high dilutions by looking lengthwise through a column in a test tube.

Dr. Gies has called my method crude, and objected to that part of my technique before you tonight in which I shook off a drop of ferric chlorid from the watch-glass to the floor, stating this is a source of error in a quantitative determination. In this also he was mistaken, for that drop had been placed intentionally at the periphery of the glass, and in nowise came in contact with film. It had been used as a ready and convenient supply of reagent, and small portions were carried on a glass rod to the film to complete the reaction. When this had been accomplished the remainder of the drop was in this manner eliminated, having had no part in the reaction.

As to the errors that might arise from unequal absorption of the alcohol-ether solution and its subsequent evaporation, I can see no foundation for contention. In every case in which the test is made 5 cc. samples are evaporated, are then brought up into the alcohol-ether solution, and diluted exactly to 5 cc., at which time the color is recorded. How do I know that the reaction is complete? Because I can always obtain the equivalent colors as shown in the table given, as can be verified by anyone who will make the test as suggested.

In my demonstration before you tonight I made the test in solutions which contained 0.005 per cent. and stronger, for which I was criticized as using solutions which plainly would be visible by the old method. My reason for doing this was that in this yellow incandescent light the weak shades of red are invisible. In the daylight the specimens of 0.001 per cent. which I have upon the table for demonstration would be clearly seen. Dr. Gies would have known this also if he had actually checked the method.

The doctor has seen fit to ridicule my statement regarding the similarity of the test for aceto-acetic acid in the urine and that of KCNS in the saliva by saying that I referred to an antiquated method of urinary analysis. The facts of the case nevertheless still remain, and no amount of ridicule will change them. Ferric chlorid is still used as a test for aceto-acetic acid, and the color which results is quite like that of ferric thiocyanate. He then asks how the alcohol-ether method eliminates the aceto-acetic acid if present. Is it possible that he does not know that the ferric salt of aceto-acetic acid is not soluble in ether?

The fact that I have substituted alcohol and ether as a solvent in place of the ether which I suggested in my first statement of the method has nothing to do with the case in point, for all of the statements regarding the behavior of alcohol and ether are equally true of the

plain ether, with the exception that the absorption of the former is somewhat greater and is therefore more delicate in its action.

In regard to the standard of colors used, I would say that they were kept in the dark, except during the time in which they were in use. It was found that they would remain true to color for a week or more, but daily test was made to note whether any sagging in the color had occurred.

The statement that the addition of the drop or two of water in the ferric chlorid solution to the dried film would produce a complete ionization of the thiocyanate formed, which in its dissociated state would be insoluble in ether, is also based upon inexperience with the reaction under discussion. It is true that in weak solutions the ionization would be high, but experience shows that the red undissociated salt is absorbed by the alcohol-ether. This may be explained by saying that the undissociated portion is removed first from the film, and that the balance in the residue being disturbed, a further association takes place from the ionized elements, which also is extracted by the alcohol-ether. This process must go on to practical completion, from the fact that the amount of red color absorbed into the alcohol-ether is equal to the equivalent of the amount of KCNS in the original solution.

Dr. Gies' failure to recognize or agree with a truism taken from Ostwald, one which is familiar to every student of the subject, can hardly be excused by a countercharge of plagiarism on my part. The statement thus quoted in the words of the great Ostwald is very germane to the subject; it agrees in every detail with the data given in the paper, and may easily be verified in the manner suggested.

In all of this lengthy discussion Dr. Gies carefully omits a serious consideration of the main issue of the paper, which was not of the determination of small quantities of KCNS in water solutions or any of the many other objections which had little to do with the case. The main issue of the paper was the discussion of that property of the alcohol-ether test which eliminated many reactions other than ferric thiocyanate which might also give red colors in the ordinary water test. Further, that in the use of the alcohol-ether test many salivas did not show as large a quantity of KCNS as was registered by the water test. If, as we have shown, the alcohol-ether method will detect extremely small amounts of KCNS in the saliva when introduced into it from without, and if upon trial we do not get an equivalent value in testing with both methods, it is but reasonable to expect that the water test is recording red reactions which are due in part to some substance other than KCNS. This is the most important function of the method suggested. In all of his discussion, which has been nearly as long as the paper, Dr. Gies has given no evidence of having made an actual test of the validity of this statement, but has contented himself with saying that it is not true.

Gentlemen, you have listened to a somewhat lengthy discussion of this subject, which I brought to you for the purpose of discussion and collaboration. There is no one who welcomes honest criticism more gladly than I, and when in error I believe that I am open to conviction. Tonight I have been told by Dr. Gies, in terms which were forceful and even bordered upon the vindictive, that I am wrong. On the other hand, Dr. Howe told us a little later that he had tried the method and had found it trustworthy. In addition I have the opinion of able chemists to the effect that my data are correct. I can therefore take this criticism as but the opinion of one man against several men whose judgment I hold in high esteem, and until others shall have taken up the question in a fair-minded and unprejudiced manner, with results which concur with that of my critic, I shall still hold to my original statement in every detail.

As regards the closing sentiments of Dr. Gies' discussion, in which he says that dentists should not attempt problems which involve chemistry, I can only

express my surprise. Coming as it does from a man who has had such large opportunity to observe conditions as they exist, such a sentiment embodied in a statement which is so wide of the truth is astounding. Does he not know that all the arts and sciences are closely linked by bonds which make them interdependent and related? Has he seen so little of dental research that he does not realize that the pursuit of any of our problems lead us immediately far afield into the special provinces of physics, of chemistry, of bacteriology, of physiology, or of general pathology, and that these problems can only be solved by the co-operation of all of our allied sciences? Our dental investigators, with their knowledge of conditions as they exist in their several problems, must go into the various fields made necessary by the character of their research, and with the aid and collaboration of specialists in these several branches of science must carry their work to its ultimate conclusion. The attitude of a self-confessed scientist who seeks to discourage research in our profession and by the members of our profession is absurd, and is deserving only of our supreme contempt.

Dr. Gies has said that he is on the warpath and that he intends to stay on the warpath of extermination and destructive criticism until someone knocks him out. This latter will not be necessary, for should he continue in the direction which he is now taking, he will kill himself by his own misdirected efforts.

The society then adjourned.

NORTHEASTERN DENTAL ASSOCIATION.

Nineteenth Annual Convention, held at Hartford, Conn., October 14, 15, and 16, 1913.

(Continued from page 622.)

WEDNESDAY—*Afternoon Session.*

THE meeting was called to order on Wednesday afternoon, October 15, 1913, at 2.30 o'clock, by the president, Dr. Murlless.

The first order of business was the report of the Board of Censors, which presented the applications for membership.

The next order of business was the election of officers for the ensuing year, which resulted as follows:

President—E. O. Kinsman, Cambridge, Mass.

First Vice-president—G. A. Maxfield, Holyoke, Mass.

Second Vice-president—A. E. Cary, Hartford, Conn.

Secretary—Charles F. Kreppel, Forest Hills, Mass.

Assistant Secretary—J. H. Jackson, Burlington, Vt.

Treasurer—David Manson, Burlington, Vt.

Librarian—D. W. Fellows, Portland, Me.

Editor—E. O. Blanchard, Randolph, Vt.

Dr. CLARENCE J. GRIEVES, Baltimore, Md., was extended the privileges of the floor, and addressed the association with regard to the work of the Scientific Research Committee of the National Dental Association.

The next order of business was a lantern lecture by Dr. J. G. LANE, Phila-

delphia, Pa., entitled "The Effect of Obstructions in the Air-Passages," which was discussed by Dr. C. H. Borden of Hartford, Conn., Dr. Milo Hellman of New York City, and Dr. R. H. W. Strang of Bridgeport, Conn.

The President announced as the next order of business the reading of a paper by Dr. EDWIN N. KENT, Brookline, Mass., entitled "Scientific Business Management Applied to Dental Practice."

[This paper was printed in full at page 29 of the January issue of the COSMOS.]

Discussion.

Dr. A. C. FONES, Bridgeport, Conn. I am very much in sympathy with this paper, as I am more or less an enthusiast on system, and have been for quite a number of years. In fact, my own office is so systematized that we hardly breathe unless we breathe in system, but I assure you we like it to the extent that we could not and would not work under any other conditions. After a system has been once established in an office, and found a success in its workings, no one would be willing to go back to a slipshod way of handling work. I believe that every man whose practice is full enough to demand all of his time at the chair, with sufficient appointments ahead to be sure of operative work from morning until night, is standing in his own light if he does not at once secure the services of a secretary. He can never progress beyond a certain point if he tries to do everything himself. Such an effort reminds me a good deal of Henry Dixie in the play "Adonis." You remember how he was talking with a customer over the counter, asking about her mother, etc. She offers a bill in payment of what she has purchased, and he puts the bill in a little ball and puts the ball on the track—you remember at that time the cash carriers in the department stores were run by gravity—then he bows to the customer, leaves her, and runs around to the cashier counter, makes the change, puts the ball back on the track, and runs back in time to receive the ball, catches it, opens it and hands her the change. When a professional man is doing the work and service of a woman in his office whose time is worth thirty cents an hour, he is losing money rapidly. When he answers his own telephone, visits with incoming patients who want appointments, leaves the patient in the chair, sterilizes his own instruments, cleans up around the chair, takes care of his own books, sends out his own bills and does a dozen other things I could mention, he is standing in his own light. He is a one-horse machine, and will not get beyond a certain point. Perhaps, however, he likes that method, and does not care to progress beyond that point. If that is his desire, all well and good, but I am speaking chiefly to the young men who have a lot of red blood in their bodies, and who want to go ahead. If you get to the point where your practice is full, get a secretary, and, as Dr. Kent says, do not get a schoolgirl, but a woman with a good head, and one who can act as business manager for you; someone who can take up the system and act as a go-between between the public and yourself, permitting you to stand beside your chair and earn five dollars or more per hour, without being constantly interrupted. The first year that I had a secretary, my practice increased twelve hundred dollars. I was wasting that much time and money by seeing people in the reception room, running to the laboratory, answering the telephone, taking care of my books, sterilizing instruments, etc. The first year I had a secretary made a difference of twelve hundred dollars, and I can guarantee that any practitioner who does not have a secretary, and whose practice is growing, will see a large increase in his receipts as soon as he engages one.

There is a great deal in Dr. Kent's paper that appeals to me. Having a system for everything about you means working comfortably. Eight or ten years ago the Hartford Society invited me to read a paper about a system of manipulating instruments. I had all the instruments in drawers and on racks, and every instrument in its place, so that it

was possible for me to turn and pick up at once any instrument within my reach, because it was in a special place. I have seen instruments piled into drawers without regard to place or system. They cannot be properly sterilized under such conditions, and that is a very poor way for a dental surgeon to keep his instruments. Of course, each man must systematize his own practice according to the number of people in his office and the demands of his practice. In my own office we have six people, four operating rooms, and a laboratory. The laboratory is a department in itself, as is each operating room. I know to a dollar how much it costs to maintain each department, and I know how much each one yields. We have a general supply closet which is the storeroom for all materials. Even the laundry is charged against each room. When the linen comes back from the laundry, it is put into the storeroom, and if I want two dozen towels in my room, they are charged against me. All of these details do not entail a great deal of work on the part of the secretary, if properly systematized. I can ask the maintenance of a certain room and what it yields, and I know to a dollar what the balance is in its favor. My charges in the laboratory are all worked on a system. The laboratory production of an inlay, for instance, is added to my chair charge, the weight of gold used and the cost of making plus a profit. I am not in the gold business, but I am not presenting to the patient material that costs me money, and I see that the inlay yields a profit from the laboratory, and that my service at the chair has its full compensation. If you who are not working on a system will calculate the time spent on a gold inlay, and see how much it yields when completed, by deducting the cost of material and the time spent in making it, you will then see whether you are charging enough to pay for your time and material. Just analyze your own practice and see what these operations actually cost you. We are professional men, but we have advanced since the last thirty-five or forty years to a stage of up-to-date business men, and I agree with Dr. Kent that we have to conduct our practices on business principles. It is not unprofessional to be a business man, and it is far behind the times to be a poorly paid professional man today. That is an inheritance of the old idea when the professional man allowed the patient to name the fee, and then waited until the patient was willing to pay it. Professionalism has gone through a revolutionary stage, until today we have arrived at a period when the patient should receive bills on the first of the month, in the same manner as you receive yours.

One word about appointments and form letters. Personally I do not like form letters. For a number of years I have used in my practice what I call the return-card system. Supposing that a patient should write and ask for an appointment, instead of using a form letter, I use an appointment card that can be filled out with the time set for the appointment, and together with that card is sent a self-addressed stamped envelope and a return card which the patient signs and returns. The return card comes back to you as a receipt that the patient has received the appointment card, and that the time set has been acceptable. The time is his, and must be paid for unless the appointment is canceled within a reasonable time, which will enable you to have the opportunity of again filling that time. I have a similar system for my prophylaxis assistant. A color scheme for the cards is used.

[Dr. Fones then passed around some sample cards which he uses in his practice.]

Dr. W. O. BEECHER, Waterbury, Conn. I, like Dr. Fones and Dr. Kent, am a thorough believer in system. I am very sorry that Dr. Kent could not remain for the discussion, as I shall be compelled to disagree with him on several points, and it is unfair to criticize a man when he is not present to defend himself. Dr. Kent has presented to us an excellent discourse on a subject which cannot be covered in one paper. I think,

however, that the title of the paper is a misnomer; it should be called "The Duties of an Office Assistant," because it covers only one phase of the scientific management of a dental practice. The essayist deals only with a certain type of practitioner who is in position to charge five dollars an hour, and to engage a dental assistant. In my opinion, only about twenty-five per cent. of practitioners enjoy these two advantages, particularly that of an office assistant. At the same time, the paper contains an incentive for everyone to advance along business lines and acquire that status. There are altogether too few dentists who aspire to reach that position. While I am a firm believer in system, yet there is such a thing as too much system. If I am going to pay a girl twenty-five dollars a week, I do not wish her to spend her time in making out form letters. Nor would I go over the correspondence and pick out those letters which need to be answered by form letters. In the course of my practice I see hardly one-tenth part of the mail, except that of a personal character. In my opinion, system, to a certain extent, destroys a man's individuality, if carried to an extreme, and when a person's individuality is destroyed, he loses a most valuable asset.

My secretary is located in my own operating room directly behind my chair. The essayist dwells on the duties of the office assistant, but to my mind that is a minor point in the scientific management of a dental practice. If the essayist had gone on to tell us how an office should be managed so that the practitioner can charge five dollars per hour and employ an office assistant, that would have been very interesting to us all. The essayist says nothing about the questions of business management of the office outside of the duties of the office assistant. Like Dr. Fones, I have a record of my own work and expenses, of those of my assistant, of the laboratory and of the extracting department, and at any time I can tell what the receipts are for the day, month, or year.

The essayist speaks about systematizing a factory in comparison with a dental office. System means, as he says, the maximum amount of production with the minimum amount of cost. If, however, a practitioner systematizes his office to the extent described by the essayist, and then does himself such work as his office assistant can do, I believe he is losing money. I think his system is a little overbalanced, and he fails to accomplish his aim.

Dr. Kent compares the dental office in its productiveness to the 30 cents per hour workman. To my mind, the dentist should not be compared to this type of man, for this reason: Factory workers follow only a certain routine, which the system prescribes for them. We are dealing with a different type of individuals, who do not need that amount of system. The whole trouble, I think, is that dentists are professional men, and like the members of all other professions, they are not business men.

Dr. Kent has presented to us a good paper which contains some very valuable points, but I believe if he had taken a broader view of the subject and touched other points besides the relation of the office assistant, it would probably have been more beneficial to us.

As to having a system of calls with a buzzer for the office girl: If the girl is in the waiting-room she cannot hear the buzzer in the laboratory; therefore I believe that a bell which can be heard all over the office is better. These are minor details, of course.

While the paper deserves some criticism, on the whole it is an incentive for us to do our share in the advancement of dentistry.

Dr. H. E. Hosley, Springfield, Mass. This paper has been of considerable interest to me, as it is my opinion that the dentists of New England are losing a quarter of a million dollars every year because of their lack of attention to efficiency. The average dentist has given very little study to this subject. I would like to commend to your attention and to your thoughtful reading three books which I think will add to your income during the coming year, if you will care-

fully study them. They are the products of business men whose minds and general training have wrought out these systems which can be applied to dental practice, each one applying them to his own practice in the way in which he may use them. These books may be a bit foreign to you, but you can pick from them those points which are most useful. One of the books is "Scientific Management," by Frederick W. Taylor; another is "Increasing Human Efficiency in Business Management," by Walter Dill Scott; the third book, and a very powerful one, which I ask you to ponder over a long time, is "Business Power," by Frank Channing Haddock. I commend these three books to your careful attention, and I hope that in the coming year a part of that quarter of a million dollars will come back to this society. At this point I want to express my keen appreciation of Dr. Fones' paper. It reminds me of a little occurrence which came about in a directors' meeting of a large business concern in a city of New England, where there had been considerable discussion regarding the working of certain systems and plans. Not one of the directors knew that these plans had been worked out, but the report was about to be made that it was not practical, when one of the engineers came in and entered the discussion; questions were asked him, and he said, "Gentlemen, it has been tried out, and it works." It seems to me that Dr. Fones is a very brilliant example of efficiency in dentistry; his methods we can all adopt to great advantage. When "It has been tried out, and it works," it is safe. Efficiency means increased prosperity and a diminution in poverty. The members of the dental profession are not poverty-stricken, but they certainly are in need of greater prosperity. With more prosperity I think we shall have better dentistry. I believe it is the duty of every member present to become acquainted with the facts regarding efficiency, which he may take home and apply in his own practice. I know of practitioners who have been able to double their capacity. That is not the limit of what efficiency will do for you. I believe that the doubling of working capacity—which means earning capacity—can be accomplished in the average practice. If you will stop and think for a moment—to make the figures easy: If you are getting six dollars an hour for your work, which means 10 cents per minute, if you will watch the minutes for a few days and make a few memoranda of the single minutes that get away from you in useless methods, you will be surprised to find how many ten-cent pieces are getting away from you. Efficiency means not necessarily harder work, but it means doing work in an easy, a more systematic way. It is one's duty to himself to get the maximum results out of the hours which he spends in his office.

The question of relaxation in its relation to efficiency the average dentist does not consider at all. If by systematic management the dentist can do eight hours' work in six hours, it means greater earning capacity if he can employ those two hours for relaxation; this is one of the hard lessons that the professional man has yet to learn. The reserve energy which relaxation brings always shows itself in the next day's work. We hear much in America of this "working" and "hustling." We hear dentists speak of how they are hustling, but hustling does not always mean increased capacity. Efficiency is not hustling; efficiency is that good, restful constant getting of results every minute, and not scurrying around, as many say, in a peck measure.

Many of you have witnessed the many profitable clinics which have been given here today, and in this connection I wish to bring this message to you: Take these little experiences from the clinics home with you, and capitalize them into efficiency in your work. I once read a definition of education—and certainly these meetings are a most valuable education—"Education is the acquirement of the ability to successfully meet an emergency when it arises." That is what we come to this convention for—to find out how to meet the various emergencies that arise.

Like Dr. Beecher, I regret that Dr. Kent has not treated the subject in a more specific way. In this connection, I would make just a few suggestions in regard to factors which I have found to promote efficiency and economy in practice. A great deal of energy can be saved by keeping water constantly heated. A little electric apparatus will keep two or three solutions heated all the time; why then waste the time of your assistant and your own by heating them over several times during the day? Instead of thick wafers of modeling compound, thin wafers should be used which can be very quickly heated. The use of the thick wafers means a considerable loss of time.

The question of fees has been touched upon. The schedule of our fees is based upon different conditions, from three dollars an hour to ten dollars an hour. The practitioner who commands ten dollars is more efficient in some way; he is not necessarily a more efficient operator, but he may be a more efficient salesman, and it may be well for the dental profession to study books on salesmanship. Many practitioners are doing work for which they are receiving little financial remuneration, which reduces their appreciation by the patients, as the American people appreciate things in proportion as they pay for them. It has been observed that patients brag of the fees they pay for certain services. They take a certain amount of satisfaction in saying to their friends that they paid so much for this or that operation. It gives them a certain amount of prestige, and the American people like to think that they have the best. A woman will go to New York to the most expensive furrier, and buy something that she could get for much less around the corner, but that does not have the trademark in the collar which she likes her friends to see. I think we should spend more time in educating our patients to an appreciation of what we are giving them—so few patients realize what dentists are doing for them, and have very little sense of the real value of dental work.

As to the matter of reading magazines, which the busy practitioner often neglects to do, I would suggest for your consideration that these magazines can be read to a degree by proxy, if you have an able secretary. I turn the magazines over to my secretary and she goes over them, and when she sees an article on a subject in which she knows I am interested, marks the page, so that I can read the marked articles with little trouble. There is a lot of worthless material in magazines, and it means a lot of time wasted to read it. The method of reading by proxy is very satisfactory when you can educate your secretary to the things you are interested in. Another considerable saving can be made in the laboratory and operating-room by the use of a vacuum cleaner. The dust is saved, and the amount of money saved from that source, in my own experience, in a short time more than pays for the cleaner.

Dr. Flanagan presented the following resolution for the consideration of the association:

Whereas, The conditions and opportunities of obtaining grammar and high-school standards of education here in New England have so changed in the last twenty-five years that we believe no one should be allowed to enter any so-called profession without at least the high-school standard of graduation as the minimum preliminary requirement; persons not having this certificate should be required to produce evidence of its equivalent on examination by proper authorities. No person should be eligible to take examination for the practice of dentistry in any of our New England states who is not a graduate of a recognized dental or medical college. Considering the opportunities now open for dental college training and the higher requirements demanded in order to best serve the public, less than the foregoing cannot be accepted in the light of professional advancement in this twentieth century; and let not New England be the last to require this standard, which already exists in more than thirty states. Be it therefore

Resolved, That the Northeastern Dental Association, in convention assembled, hereby heartily indorses the sentiments herein expressed.

Dr. BOARDMAN. I move the adoption of the resolution.

The motion was carried.

Dr. C. W. STRANG. By the union of the New England Association and the Connecticut Valley there came into existence the Northeastern, and with that organization there came to us as secretary Dr. Kinsman, who has faithfully performed the duties of secretary of the Northeastern from 1895 until the present time. Few of us probably realize the magnitude of the work he has done, and in view of the fact that he will no longer be our secretary, and in recognition and appreciation of the valuable and faithful service of Dr. Kinsman as secretary of this association, I would move that an appropriation of $50 be made to him from the treasury of this association.

The motion was carried.

Motion was then made and carried to adjourn until Thursday morning at 12 o'clock noon.

THURSDAY—*Morning Session.*

The meeting was called to order Thursday morning at 12 o'clock by the president, Dr. Murlless.

The Secretary presented the list of applications for membership.

Motion was made and carried that a vote of thanks be extended to Dr. P. T. O'Reilly, Holyoke, Mass., for the part he took in entertaining the members of the association at the smoker on Wednesday evening.

Dr. BOARDMAN moved that a vote of thanks be extended to the retiring officers for their efforts on behalf of the association during the past year. Dr. McManus asked that in that be included the members of the Local Committee.

The motion was carried.

Dr. McLEAN moved that the newspapers of the city be extended the cordial thanks of the association, particularly the Hartford *Evening Post,* for their courteous treatment of the association during the meeting in Hartford.

The motion was carried.

Dr. FLANAGAN moved that a vote of thanks be extended to Dr. Anthony and to the DENTAL COSMOS for assistance given during the meeting.

The motion was carried.

Dr. HENRY McMANUS moved that a vote of thanks be extended to the exhibitors for their part in making the meeting a success.

The motion was carried.

The next order of business was the installation of officers, after which the association was declared adjourned until the next annual meeting.

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Devoted to the Interests of the Profession.

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EDWARD C. KIRK, D.D.S., Sc.D.

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PHILADELPHIA, JULY 1914.

EDITORIAL DEPARTMENT.

"THIS THING" AND "THAT THING."

THE Editor desires to announce that he has never aspired to the unattainable by attempting to please "all of the people all of the time." This announcement seems to be justified because it not infrequently happens that one or more critics dissatisfied with views from time to time editorially expressed favor this office with attempts to convert the Editor from what they deem to be the error of his ways, and to lead him by gentle argument back to the ways of intellectual and professional rectitude. For these friendly admonitions we are always grateful, and though it may occasionally happen that they do not lead to conviction of error and final conversion, they are nevertheless helpful to the extent at least of indicating the critic's point of view.

All the foregoing has to do with the fact that an esteemed colleague chides us for our position as stated in the June issue with respect to the repeal of the law of Virginia requiring the

attainment of the medical degree as a prerequisite for obtaining the license to practice dentistry in that state. He says:

> In reply to your editorial in current issue of COSMOS entitled "Weighed in the Balances and Found Wanting," I wish to say that this law was repealed before it had ever had a chance. It was never put into effect. This being true, it cannot be said that it was found wanting. It is believed that the influence of the schools caused the repeal. But the time will come when all dental men will hold the degree of M.D. Virginia may have been a little premature, but the profession and the public are demanding this thing, and the schools might just as well take notice.

The criticism that this law could not have been "found wanting" before it was put into effect is rather a curious, not to say inconsistent point of view. One who knows that he cannot swim does not have to jump overboard to demonstrate to himself or to his friends that he will be found wanting that ability when he gets into the water—everybody knows that beforehand; and so on in cases too numerous to mention, based upon common human experience, the old dental law of Virginia included.

"It is believed that the influence of the schools caused the repeal." What schools it is not stated, nor whether medical or dental schools are intended to be made the scapegoat for the unrighteous act of repeal. Well, it is natural under the circumstances that "the schools" should bear the odium. All the crimes and misdemeanors that have hindered and obstructed professional progress have been systematically laid at the door of "the schools," until the attentive observer of these chronic criticisms might be pardoned for concluding that "the schools" are sinks of professional iniquity. When "the schools" and "they say" are brought into a co-operative alliance it is certainly an unholy combination.

But our critic, while admitting that "Virginia may have been a little premature," prophesies that "The time will come when all dental men will hold the M.D. degree," and sounds the warning that because the profession and the public are demanding "this thing," "the schools may as well take notice." What profession, let us ask, is demanding "this thing"? and what kind of a thing is "this thing" that "the profession" and "the public" are demanding? "The profession" and "the public" of Virginia appear to have been, by our critic's own admission, "a little premature" in enacting the medical-qualification-for-dentists law. Now,

our critic intimates that "the schools" brought about the repeal. Well, Virginia, "the profession" and "the public" must therefore be under everlasting obligation to "the schools" for having headed off a calamity in Virginia education by preventing Virginia from doing an immature as well as a premature thing.

As we see it, the gist of the whole matter is this: It is impracticable, wasteful of time, money, and energy, and productive of an inefficient educational waste product, to attempt to make a dentist by basing his professional education upon the foundation represented by the present standard medical curriculum leading to what our critic designates as "this thing" called the M.D. degree. The M.D. degree that is coming, and which we believe will in due time be held by future dentists, will not be "*this* thing" but "*that* thing" which will represent a medical education adapted to the efficient practice of dentistry. Which means that the present medical curriculum will in the very nature of the circumstances have to be reorganized with reference to the necessities of the many and constantly growing specialties of the science and art of healing, dentistry included.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Dental Record*, London, May 1913.]

A SIMPLE METHOD OF CONSTRUCTING ARTIFICIAL OBTURATORS AND VELA IN CASES OF CLEFT PALATE. By Wm. Simms, L.D.S., Manchester, Eng.

An ordinary impression of the mouth is taken as for an upper denture. No attempt is made to obtain an impression of the cleft and divided uvulæ, in the belief that no absolutely accurate and workable impression of these mobile parts can be obtained, even with plaster of Paris. An accurate impression of the remaining portions of the hard palate, and any remaining teeth, with a definition of the margins of the anterior portion of the cleft, is all that is necessary.

From the plaster model obtained from such an impression, metal molds and counter-molds are prepared to facilitate the striking-up of a copper or brass plate, which approximately is to represent the portion of the denture corresponding to the hard palate.

In the case of an obturator, two copper wires are soldered to the posterior end of this plate on its nasal side, of sufficient length to almost reach the posterior wall of the pharynx when the metal plate is placed in its position in the mouth, and just sufficiently apart to freely enter the cleft. The copper wires can be easily adjusted to the mouth, to correspond to the required arch on the nasal side and to be of the required length in the direction of the pharynx.

This portion of the work being now completed, ordinary sheet wax is taken, and a portion sufficiently large to form the upper floor is waxed on to the nasal side of the two wires, and adjusted to the mouth until satisfactory. Waxed sides are then affixed to this portion, and by trial in the mouth are so placed as to satisfactorily close the cleft. The palatal wax wall and the pharyngeal wall now remain to be waxed in, care being taken by observation and trial to reproduce the shape of the missing palatal arch. A model being thus obtained of the required shape for the obturator, it is placed in the plaster model originally obtained, and by building up plaster around the waxed shape—in sections by preference—a model of the mouth for the construction of the required obturator is obtained, and the case may be completed by the ordinary methods familiar to the dentist.

For the construction of a denture with an artificial velum, the procedure is the same up to and including the affixing of the two wires on the nasal side of the plate. In addition, two shorter wires are soldered to the palatal side of the metal plate, but in this case sufficiently wide apart to extend on each side of the divided cleft. The wires also on the nasal side may be so separated as to be a little wider than the cleft itself. In trial in the mouth the sides of the divided cleft will be found to drop down over these wires.

Wax is affixed to the nasal side of these wires, but wider than the cleft, so as to rest in the upper surfaces of the divided soft palate. Careful adjustment of the wax shape is made at this stage, and this is facilitated by the unobstructed view which may be obtained of the parts when *in situ*. The wax palate is now placed on the two palatal wires, and this should be sufficiently wide to prevent the appliance being drawn through the cleft. This portion of the work satisfactorily accomplished, the upper and lower wax plates are joined in the central portion by additional wax, and a model of the required parts may be obtained, as in the case of the obturator, but in four sections, which can be reproduced in tin according to the orthodox methods.

[*New York Medical Journal*, New York, October 4, 1913.]

ORAL SEPSIS AND ITS DANGERS. EDITORIAL.

[*New York Medical Journal*, October 25, 1913.]

ORAL SEPSIS AND ITS POSSIBLE DANGERS. BY R. C. ROSENBERGER.

[*New York Medical Journal*, March 14, 1914.]

THE RELATIONSHIP BETWEEN ORAL SEPSIS AND INTESTINAL STASIS. EDITORIAL.

[*New York Medical Journal*, May 16, 1914.]

ORAL SEPSIS OF DENTAL ORIGIN. BY W. H. HASKIN.

[*New York State Journal of Medicine*, New York, September 1913.]

RELATION BETWEEN CARIOUS TEETH AND MALNUTRITION. BY C. D. CARTER.

[*American Journal of the Medical Sciences*, Philadelphia, February 1914.]

DENTAL SEPSIS: ITS RELATION TO THE SYSTEM. BY C. N. B. CAMAC.

[*Proceedings of the Royal Society of Medicine*, London, November 1913.]

RHEUMATOID ARTHRITIS TWICE CURED BY REMOVAL OF SEPTIC TEETH. BY F. ST. J. STEADMAN.

[*Proceedings of the Royal Society of Medicine*, London, April 1914.]

DENTAL SEPSIS FROM THE POINT OF VIEW OF THE PHYSICIAN. BY T. J. HORDER.

[*Australian Journal of Dentistry*, Melbourne, November 29, 1913.]

PROSTHESIS AND SEPTICITY. BY ARTHUR HARROP.

[*Le Laboratoire et le Progrès Dentaire*, Paris, November 10, 1913.]

A CASE OF SEVERE SYSTEMIC COMPLICATIONS OF DENTAL ORIGIN. BY F. FABRET.

As has been repeatedly pointed out in these columns, the consideration which dental diseases and dental treatment have been receiving within very recent years from the medical profession is one of the most gratifying and convincing signs that dentistry has come into its own. As the *New York Medical Journal* expresses it editorially: "Until comparatively recently the serious consequences likely to result from septic oral conditions were not at all adequately appreciated. Thus, for instance, pyorrhea alveolaris was generally thought of as simply an offensive local disorder, and not as the frequent source of systemic infections, sometimes mild, and sometimes of the gravest character. During the past few years, however, the subject has attracted considerable attention, and various writers have shown the probable, if not positive, causal relationship of oral sepsis to irregular febrile disturbances, aural disease, serious forms of anemia, arthritic affections, and other pathological conditions. It has been asserted, on apparently reasonable grounds, that infected teeth may be the cause of various neuroses and psychoses, and not long since Joseph Collins published some experiences which had convinced him that serious organic disease of the nervous system may originate from Riggs' disease.

The last paper written by the late Dr. Francis P. Kinnicutt, which he read at the meeting of the Practitioners' Society of New York, was on the subject of oral sepsis. In this he especially emphasized the fact that local symptoms of pain and discomfort are often insignificant, while the local signs, on superficial examination, seem inadequate to explain the systemic disturbance. The obvious local signs may consist in no more than caries of one or several teeth, a contiguous gingivitis, and not infrequently an associated diffuse pyorrhea alveolaris of varying intensity. It has apparently been demonstrated, however, that the micro-organisms of dental caries are particularly virulent, and it is only the natural resistant powers possessed by the tissues of the mouth which prevent their effects from being more commonly disastrous. His experience, he states, has been wholly in accord with that of Munter, who has published various communications upon the subject, showing that many slight, ill-defined disturbances of health, as well as grave systemic disturbances, may be traced to oral sepsis. In addition to cases which he reports in detail, he refers to one of severe oral sepsis associated with grave anemia and combined sclerosis of the cord which had recently been under his observation at the Presbyterian Hospital.

Notwithstanding all that has been written

in regard to the matter, it is to be feared that even now the dangers of oral sepsis are not as generally appreciated as they should be by the profession, to say nothing of the public at large. Dentists have been laying much stress upon the importance of "clean mouths," but at the same time there is reason to believe that in a considerable proportion of instances the oral sepsis is directly attributable to their own crown and bridge work, now so much in vogue, presenting, as it does, a constant *nidus* for possible infection. After all, the great point to be striven after is prevention, and the most encouraging feature of the present situation is the recognition of the detrimental effect of oral sepsis upon the physical and mental development of the child, and the consequent increasing attention which is being paid to the care of children's mouths. Thus, in New York, the Bellevue and Allied Hospitals have for the past five years maintained dental departments, and there are similar departments in the various dispensaries of the city and the health department clinics for school children in the different boroughs, while that in Richmond is dental exclusively."

Rosenberger, in a forceful paper, points out the importance of immediate treatment of all oral lesions, no matter how insignificant apparently. He remarks that headaches, flushes of heat, pain referred to the eyeballs, sometimes slight or pronounced fever, malaise, and other vague symptoms, chills or pronounced rigors can very easily be traced in some cases to the condition of the teeth and mouth, as can gastric disturbances and intestinal disorders which apparently are not caused by errors in diet.

The *New York Medical Journal* again editorially points out the close relationship between oral sepsis and alimentary toxemia, brought about, as Sir Arbuthnot Lane and his followers assert, by intestinal stasis.

Whether it is one of cause or effect, however, is as yet an open question. Sir William Hunter and Dr. Eric Pritchard materially agree with Lane, and the close connection between attacks of rheumatoid arthritis and intestinal stasis and oral sepsis has been traced by many other authorities. That the occurrence of both tuberculosis and rheumatoid arthritis, together with intestinal stasis and oral sepsis, is much more than a coincidence would seem to be proved by the fact that therapeutic or operative measures which have successfully relieved or cured intestinal stasis and oral sepsis have also relieved or cured joint tuberculosis and rheumatoid arthritis, and even, it is said, pulmonary tuberculosis.

Haskin discusses the medical and surgical aspects of sepsis of dental origin, showing some striking radiographs of poor dental work, and anatomic specimens exhibiting the effects of pyorrhea alveolaris upon the osseous tissue, and urges that more attention be paid to the pyogenic conditions which are causing so much disease.

Carter traces the relationship between dental caries and malnutrition, and cites Dr. J. B. Murphy's, Dr. Wirgman's, and Dr. Turner's reports of arthritic conditions due to pyorrhea alveolaris. He, too, emphasizes that a clean mouth and a well-kept set of teeth are very necessary to general health.

Camac offers an interesting review of the work done by his American dental colleagues regarding the relation of dental sepsis to the system. He advocates the direct consultation between dentist and internist and their continued co-operation in the care of cases, and condemns the tenacity with which patients and dentists will insist upon retaining badly diseased teeth, which frequently lead to arthritic infection or actual death through septic invasion of some vital organ. He gives several most instructive case histories illustrated by good radiographs, and urges that in order to arrive at a scientific and practical classification of these cases, internists and dentists should work together, since a great many questions, such as the relation between tonsillar and peritonsillar and faucial infections and dental disease, of Vincent's bacteria and dental disease, the drainage of infected areas by the lymphatic system, and many others, remain still unsolved.

Horder enumerates the many diseases which can be directly traced to oral sepsis, and berates the skeptics who argue that the question of dental sepsis is overstated. Even though dental sepsis is more common than the incidence of all the associated diseases put together, this does not constitute dental sepsis a virtue. When it is said: "Look at this man; he has a septic mouth, yet he is in good health," it by no means follows that the man is as healthy as he is capable of being. It is quite true that dental sepsis is often only one of several factors keeping

a morbid state going, but it is not seldom the chief cause; and often, if set right, it enables the patient, by his increased resistance, to set right the others himself. If a doctrine is good, we have high authority for preaching it "in season and out of season;" when the owner of septic teeth is ill, it is "in season," and the physician who does not preach repentance and the dental chair is no true physician. Let the dentist see to it that, when the same man is not ill but makes the visit to him rather than to his doctor, though it is "out of season," the same warning is preached with equal insistence.

The relationship between septic teeth and joint infection is demonstrated beyond doubt by Steadman's case in which rheumatoid arthritis has twice been cured by the removal of teeth. This case also shows that a comparatively small amount of sepsis in the mouth is sufficient to account for grave joint lesions.

Harrop lays stress on the damage done by dentures made on the orthodox plan, their design not only being mechanically injurious to the remaining teeth and mucous membrane, but being such as to render the efficient cleansing of such appliances difficult if not impossible. Clasps should be so constructed as to leave the gum margin entirely free from pressure. More attention, too, should be paid in the construction of vulcanite dentures, especially to the surface which comes in contact with the mucous membrane. In crown work he follows the following principles: (1) To crown only as a last resort; large restorations in the form of fillings or solid or hollow inlays are far safer. (2) Never to undertake to crown a root of the permanent health of which there can be any doubt, unless in such a way that free access may be easily had to the root-canal in the event of trouble arising. (3) To construct the crown so that it can be as easily cleaned as a natural tooth. (4) A perfect joint, either of the band or end to end, is essential. Banded crowns should never be fitted beneath the gum margins, except in the anterior teeth, and then only slightly beneath. Removable bridges should be constructed wherever feasible, and in fixed appliances hygienic principles should be very carefully observed.

Fabret reports a most instructive case of a mining engineer who had neglected his teeth badly, and who upon extraction of the most painful offenders experienced in succession severe hemorrhage, several alveolar abscesses, severe septicemia, diffused phlegmon in the cervico-facial region, purulent pleurisy, suppurative perinephritis, abscess in the left kidney, adeno-phlegmon in the left iliac region, and recurrent deep-seated abscesses. After complete and thorough treatment of his mouth was undertaken, he entered into a period of convalescence, and in a few months completely regained his health. The writer concurs with the surgeon in charge of the case in the opinion that the septicemia with all its metastatic manifestations had originated in the foci of infection in the mouth. This case accurately portrays the possible serious complications of mouth infection induced by caries and superinduced by diseases of the pulps and peridental membranes and the soft tissues of the face and neck.

The evidence represented in the essays reviewed—to which a great many more might be added—is so overwhelming that the argument that dentistry is a foremost mechanical pursuit and that the practical side of dentistry is the most important seems to lose almost all its weight. What harm the purely mechanical consideration of a dental operation may induce is fully evident from the above, and much as the vaunted "practical man" may deny or decry the fact, dentistry is undergoing an important revolution. As Camac states it—"Throughout the country today there is developing a class of dentists whose opinions are based upon carefully weighed evidence, and who are devising and carrying out operative measures as delicate in technique as some of the more important surgical operations. The dentist and the internist, through the improved standards of dental work, are coming together more and more in consultation and co-operation."

[*Lancet*, London, December 27, 1913.]

ANESTHETICS. THE ANNUS MEDICUS 1913.

[The *Practitioner*, London, November 1913.]

A CRITICAL SUMMARY OF SOME RECENT WORK ON ANESTHESIA. By J. BLUMFELD.

[*Lancet*, London, September 6, 1913.]

ANESTHETICS IN 1881 AND 1913. EDITORIAL.

The subject of anesthesia, both general and local, has within recent years come so much

into the foreground of medical and dental interest that it is practically impossible, within the limitations of this department, to record all the steps in advance which have been following each other in such rapid succession. For this reason we welcome the opportunity of reproducing in part the reviews of the work done in anesthesia within the year 1913, which appear in the journals quoted.

In its September 1913 editorial, the *Lancet* draws a timely comparison, saying: "The whole subject during the generation which has expired between 1881 and 1913 has cast off much of its unscientific trappings, while its exponents from across the seas, equally with those who are British, can lay claim to pursuing their work along lines more or less scientific. The scope of anesthesia as we know it today is so far wider than it was in the times of Simpson and of Clover that an entirely different language is used in describing the results and the procedures. Practically, nitrous oxid, ether, and chloroform, given by the simplest apparatus or without any at all, formed the armamentarium of the whilom anesthetist. . . . At the recent International Congress of 1913, the subject was reckoned of sufficient importance to obtain its inclusion as a subsection, and to tempt into its arena such distinguished pioneers of new developments as M. Tuffier of Paris; Professor Heinrich Braun of Zwickau; Professor L. Burkhardt of Nürnberg; and that eminent scientist, Dr. S. J. Meltzer, of the Rockefeller Institute." The methods of introducing anesthetics have been revolutionized, and in other directions progress no less gratifying has occurred. In the days of Snow and Paul Bert, as in our own, fierce have been the contests about the dangers of anesthetic agents. There have been those who delighted to say "I am of Paul," and in response we heard "And I of Apollos;" the chloroformists *versus* the etherists, the heart-failure men against those who believed dangers arose alone from respiratory failure. Today we find that such questions can be, and indeed are, put to the test of experiment. The anesthetist no longer confines his attention to the circulatory and respiratory systems; he recognizes that metabolism may be profoundly and deleteriously affected by his agents, and his endeavor is to obtain all the good he can from his anesthetics and rob them of their potential evils. All methods adopted to prevent pain, whether those connected with inhalation, with spinal anesthesia, or with local analgesia, are subject to the disadvantage that they may produce shock, even though in their intense action it may have been their beneficent rôle to abrogate shock due to surgical trauma. Alike as synergents to anesthesia and as a means of abolishing this shock are the employment of alkaloids and the combining of general anesthetics with local conductive analgesia; and these complex systems have found expositors in Dr. Crile and Dr. Gauss, both of whom are recognized as originators of special methods. Certain anesthetics are held provocative of shock, so that nitrous oxid associated with oxygen is preferred by some surgeons. The technique of their use in major surgery has been worked out by Dr. Teter, and his report and description of his modified apparatus proved how scientifically such schemes are now elaborated.

Of special interest to the dentist are the chapters on local anesthesia in the Annus Medicus 1913 report on Local Analgesia, on Nitrous Oxid and Oxygen, and on Anoci-association and Shock. Brauns' regional anesthesia by novocain-suprarenin as adopted in Fischer-Riethmüller's text-book on "Local Anesthesia in Dentistry," 2d ed. Philadelphia, 1914, has received perhaps the greatest share of attention, and the swinging of the pendulum toward local anesthesia is evinced by Dr. Crile's anoci-association, based upon a combination of nitrous oxid and oxygen, which Crile, both on theoretical and experimental grounds, considers as more efficient in guarding against shock than ether and local novocain-suprarenin injection. Blumfeld remarks in regard to modern methods of general anesthesia that complexity of apparatus, is indeed, their bugbear. Yet, if the patient's gain by employment of the method is considerable, the trouble involved in conveying a cumbersome collection of cylinders and tubes is not to be weighed against it. Teter, who has done so much work in connection with this form of anesthesia, is an advocate for always delivering the gases warmed, which of course adds further to the apparatus required. Unlike some, he recognizes the limitations of the powers of nitrous oxid and oxygen as regards muscular relaxation. This anesthetist has used nitrous oxid

and oxygen with positive pressure for intrathoracic cases, and has not met with any cessation of respiration even of a temporary nature; from 6 to 8 mm. Hg he considers the best pressure, but greater can be employed.

Of articles of special interest in this connection we would mention "Irritability of Tissues Suppressed by Anesthetics Through Modifications of Cell-membranes," Editorial, *Journal American Medical Association*, September 20, 1913; "Changes in the Blood in the Causation of Surgical Shock," by A. Rendle Short, *Lancet*, March 14, 1914; "The Influences of High Altitude in Connection with General Surgical Anesthesia," by G. W. B. Daniell, *British Dental Journal*, February 16, 1914; "Administration of Alkaloids Before Anesthesia," by I. C. Herb; "Nitrous Oxid and Oxygen Anesthesia," by H. G. Sloan, and "Local Anesthesia," by J. F. Mitchell, *Journal of American Medical Association*, September 13, 1913.

A study of the wonderfully generous harvest in the field of anesthesia of last year and the first months of this year will convince any fair-minded reader that there is a great deal of work yet to be done both in general and in local anesthesia; that both procedures have their definite places, and that the men who are endeavoring to create an artificial prejudice as to either one or the other method are wickedly and selfishly impeding progress and doing a great injustice to dental science, which has contributed so much to the present status of perfection of anesthetic means.

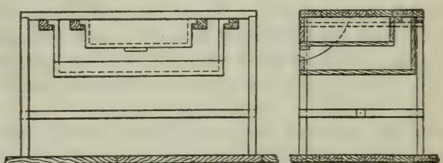
PERISCOPE.

Unslaked Lime for Desensitizing Hypersensitive Dentin.—For the desensitizing of hypersensitive dentin, Calvo recommends the application of the rubber dam, drying the hypersensitive cavity by some simple means, yet leaving enough moisture in the cavity to slake a small amount of unslaked lime. A sensation of heat is perceived which, however, disappears readily.—*Sud-Est Dentaire.*

Removing Gold Foil from Low-fusing Porcelain Inlays.—In order to remove from low-fusing porcelain inlays the gold foil which often adheres to them very firmly after baking, the inlay is laid in aqua regia, which dissolves the gold without harming the inlay. A quicker method consists in burring the gold away with a very fine rosehead bur.—*Oestereichische Zeitschrift für Stomatologie.*

Salvarsan ("606") in the Treatment of Vincent's Angina.—In treating Plaut-Vincent's angina, painting with a glycerin-salvarsan mixture—0.1 gram salvarsan triturated in a mortar with 5 cc. of glycerin—will produce healing of the ulcers in a few days. In this form of angina, spirochetes play an important part beside the fusiform bacillus. (See "Local Treatment with Salvarsan in Diseases of the Oral Cavity Due to Spirochetes," DENTAL COSMOS, November 1912, p. 1288.) The writer thinks that salvarsan could be applied to advantage in pyorrhea alveolaris.—J. CITRON, *Berliner Klinische Wochenschr.*, per *Deutsche Monatsschr. f. Zahnheilkunde.*

Handy Arrangement of Bench Drawers.—A good method of arranging drawers to hang under a bench, and one which permits anyone working at the bench to sit down, is shown in the sketch, and, as may be seen,



consists of a small drawer, in which can be kept the small and most used tools, within a large drawer, to hold work under construction, scraps, filings, or other things which would otherwise have to be kept on the bench.

Another purpose for which the edge of the large drawer can often be used is to rest work on while sitting down and filing, holding the work with one hand and filing with the other. This drawer is both handy and space-saving.—*Popular Mechanics.*

Hints on Taking Impressions.—In taking upper impressions in older persons, the upper lip should be retracted by means of a retractor. The muscles are relaxed by having the patient pronounce the word "wow." The impression tray should always be tried first in the mouth. In order to counteract undue muscular tension in taking lower impressions, the tongue is protruded as long as the plaster is soft. To improve the taste of the plaster, the writer mixes the water with about a quarter dessertspoonful of an alcoholic solution of orange or lemon peel oil. Mixing three parts of plaster with one part of talcum prevents the breaking of the impression into many small particles.—D. W. Barker, *Dental Summary*, per *Zahnaerztliche Rundschau.*

Paper Points for Root-canal Treatment.—Owing to the uncertainty of the aseptic condition of cotton, root-canals may be dried, cleaned, and dressed with absorbent paper points, to be kept sterile in a glass vessel containing a sponge or piece of cotton saturated with formalin. The points are taken up with sterile pincers, and can be either cut or preferably burnt to suit any root-canal. These points save the operator the tedious and often aggravating procedure of wrapping a strand of cotton on a broach; there is no danger of the paper point exerting a piston-like action in the root-canal and forcing infectious material through the apical foramen, and a maximum of asepsis is guaranteed.—H. Pichler, *Oesterreichische Zeitschrift für Stomatologie.*

Topical Application of Sodium Salicylate in Oral Lesions.—In oral lesions, especially those of the gingivæ, sodium salicylate acts not only as an antiseptic but reduces congestion and pain. In aphthous stomatitis, pyorrhea, and ulcerations in whooping-cough the writer employs this drug in form of a mouth-wash, as follows: Sodium salicylate crystals 5 gram, neutral glycerin 30 gram, cherry-laurel water 10 gram. In infections due to spirilla, arseno-benzol—viz, salvarsan—is preferable to this agent. Following difficult extractions a 20 per cent. solution of sodium salicylate in local, tepid applications relieves post-operative pain almost immediately, and hastens cicatrization.—Dr. Plicque, *Bulletin Médical*, per *Revue de Stomatologie.*

Facilitating the Taking of Impressions.—If single teeth remain in the mouth, distortion of the plaster cast in separating the cast from the plaster impression can be avoided by first taking an impression with modeling compound, which, while it is still soft, is widened either with a finger or an instrument handle at the places which will offer difficulties in separating. After this enlarged modeling compound impression has hardened, which can be hastened by dipping into cold water, it is filled with plaster, and the final impression is taken. This impression is easy to separate from the cast, as the places where teeth are left are marked by the projecting plaster. These teeth can be further safeguarded against breaking by inserting before pouring the cast, little matchsticks into the depressions left by the remaining teeth. An enlarged modeling compound impression is of great service also in edentulous cases, especially if a high palate is present. In taking an impression of a few teeth in crown- and bridge-work, it is very practical to take a preliminary modeling compound impression, which, after having been suitably widened, takes the place of a partial impression tray.—*Zahnärztliche Orthopädie und Prothese.*

Combination Laboratory Seat.—A most practical and satisfactory way of using a stool in the laboratory is shown in the accompanying illustration. The attachment shown converts the stool, the seat of which is too low except for bench work, into a comfortable and neat seat for working at the lathe.

A plate with a set-screw is mounted under the center of the stool seat, through which a hole is bored for the seat-post. Two pieces of iron pipe, an elbow, and an old bicycle saddle constitute the remaining parts of the device. Provision is made for adjustment as to height, and the position of the saddle may be changed in the ordinary way by using a wrench on the part which grips the horizontal length of pipe, in the same way as the seat on a bicycle seat-post is adjusted.—*Popular Mechanics.*

Convenient Preparation of Tincture of Iodin.—One week after preparation ordinary tincture of iodin becomes an irritant; one month after, a caustic. Tincture of iodin which has thus become altered by the formation of hydriodic acid may destroy the epidermis and open the way to infection. To overcome this drawback, the addition of 35 gram iodid has been proposed. Thus iodized, the tincture becomes inalterable. The preparation of tincture of iodin according to the Formulary requires three or four hours. It can be prepared more quickly by making a solution by means of distilled water, a mixture of iodin and sodium iodid in 95 per cent. alcohol, or pure iodin in 95 per cent. alcohol in which sodium iodid has been dissolved. This makes a strongly iodized alcoholic solution of iodin.

If, instead of disolving iodin crystals in 95 per cent. alcohol, which is a very slow procedure, iodin is used which has been obtained by precipitation in a saturated alcoholic solution by means of distilled water, a tincture of iodin can be readily made by simple dissolving. The precipitated iodin, desiccated with sulfuric acid, represents a very fine black powder, which dissolves in 95 per cent. alcohol within three minutes.—C. R. H. Abel, *Archives de Médecine et de Pharmacie Militaires,* per *Bulletin du Syndicat des Chirurgiens-Dentistes de France.*

The Vulnerable Mandible in Boxing.—The mechanism of the "knock out" blow on the lower jaw is discussed by Dr. Somen of Paris, who, as scientist and sportsman, claims to have had subjective experience for his theories. These phenomena have been variously attributed to a sudden displacement of the brain or the cerebro-spinal fluid, or to reflex inhibition. Dr. Somen's theory—according to the French correspondent of the *Lancet*—is that the shock of the blow on the chin is transmitted through the temporo-maxillary articulation to the internal ear, where the disturbance of the semicircular canals gives rise to vertigo, loss of equilibrium and of consciousness. The interference with equilibration is even more pronounced when the blow is received on one side, which accounts for the more severe effect of such a blow over one received in the middle of the chin. The dangerous points for the boxer are those whence reflexes take their origin—the epigastrium, from its relation to the solar plexus, and the lower jaw from its relation to the semicircular canals of the internal ear. The anterior surface of the larynx should also be mentioned, a blow on which may induce a fatal reflex, but this blow is ruled out in boxing.

Many dental and general surgeons called upon to treat mandibular fractures after sporting or other accidents have been puzzled by the grave general symptoms where the jaw lesion was the only observed injury, as also by the fact that these symptoms rapidly subside.—*British Dental Journal.*

Crowning of Broken-down Roots by a Combination of Half-band and Inlay.—It is often possible satisfactorily to crown a root of which the labial wall has been fractured some 3 or 4 mm. under the gum line, by a combination of half-band and inlay. Having removed the loose portion of the root, and somewhat controlled the hemorrhage, the pocket is touched with trichloracetic acid and packed with gutta-percha, dismissing the patient until the following day, when it will be possible to get a clear view of the root end. A band is made as for a full-banded crown, leaving the labial portion much deeper than the palatal, and to this only the palatal half of a floor is soldered. Before placing this on the root end to obtain the relation of the pin to the floor, the labial portion of the band is slit and the free ends are so adjusted that on fitting the floor to position the labial portion passes under the free margin of the gum approximately up to the point of fracture. Then an iridio-platinum pin is soldered in position, and after filling the labial half of the cap with inlay wax, it is forced into position on the root end, when it will be found that the labial portion of the band has acted as a tray for the retention of the wax, and a good impression of the root end will result.

In casting, the sprue is inserted in the labial half of the under surface of the cap, to which the floor has not been soldered. The rest of the procedure is the same as in the construction of a Richmond or any other porcelain-faced crown.—W. C. P. Hough, *Commonwealth Dental Review.*

Particulars of the Manufacture of Carborundum for Dental Purposes.—In manufacturing carborundum two elements are required, carbon and silicon. The former is derived from coke, and the latter from sand.

To insure the proper mixing of the coke and sand it becomes necessary in the first place to have the coke crushed in a mill; it is then mixed with the sand. After several other details of treatment the mass of raw material is placed in an electric furnace, where for thirty-six hours an electric current is passed through, allowing a path of high resistance. The resistance thus interposed re-

sults in the generation of enormous quantities of heat. The temperature of the resistant part of the surrounding coke and sand being raised to a point between 7000° and 7500° F., all the impurities and substances of coke and sand are destroyed, and the atoms of these two elements fly together and unite as carborundum.

After being allowed to cool slowly, and on being removed from the furnace, it is found that the outside or outer crust is composed of a thick black mass of amorphous carborundum, which is removed, and leaves the fine remains of beautiful carborundum crystals, tinted with many glowing colors.

The crystals are then crushed by immense steel wheels, and the grains are carefully washed preparatory to being sorted into grits, which is done by using screens of different meshes.

Clay binding wheels are then mixed with the different grits, and are fashioned into the different sizes, which are then packed into immense kilns and vitrified at a heat approximated at 2500° F.—*Australian Journ. of Dentistry.*

Preservation of Keen Cutting Edges of Rotating Instruments.—The question of the durability and preservation of keen cutting edges on rotating instruments, such as engine burs, is admittedly one of great practical importance to the dentist. The durability varies according to the speed of working, and as some recent experiments in cutting metal have shown that the durability and cutting power are at their best at certain definite speeds, it is quite possible that an experimental inquiry as to the speed most suitable for cutting hard dental tissues might have a useful result.

In a paper read at the Iron and Steel Institute by E. G. Herbert, the author stated that when cutting at very low speeds all the tools were more durable when water was not used and they were allowed to become somewhat heated. At the low speeds, 20 feet to 30 feet per minute, the tool was most durable when cutting dry, and least durable with water. At the highest speeds the position is reversed, while at intermediate speeds lard oil gave the highest durability. Steel would appear to have low values of hardness and toughness at 50° to 100° C. The cutting tests showed that the durability always increased when a tool working at 20 feet per minute is allowed to cut dry instead of with water, or with hot water instead of cold.

Again, when a certain limiting speed is exceeded, there is a decline in durability caused by an actual softening of the cutting edge by the heat generated in cutting. This softening, which is extremely local, takes place even when the tool and the work are practically immersed in running water.—*Dental Record.*

Scope of the Oral Hygiene Movement.—The mouth hygiene movement logically and inevitably must exert itself in the field of dietetics as well as hygienics.

The foundation for the accomplishment of better dental conditions for school children and the industrial population is a consistent and insistent campaign of education.

The establishment of a dental service for school children and the great mass of the industrial population will be accomplished more easily, be accepted more readily, with more certain results, by reason of the preliminary educational campaign.

The dental nurse will prevent for both the school children and industrial population the destruction of their teeth; under present conditions they are unable to pay for dental service, and for such service there does not exist a sufficient number of dentists.

The dental nurse, for reasons of expediency, economy, efficiency, and adaptability becomes the keystone of the mouth hygiene movement.

Dentistry for the great mass of the adult industrial population will be obtained either by the co-operative effort of the workers, the desire for efficiency by the employer, or by government service instituted in connection with government health insurance.

The life insurance companies will, as an added protection, include dental examination for insurance as well as mouth hygiene in their conservation departments. The companies have shown an interest in this that indicates that at a not very remote date, oral conditions will receive their attention.

The work of the dental surgeon will be largely preventive dentistry, examinations, and direction of the dental nurses.—A. M. Nodine, *Dental Brief.*

A Method of Finding Root-canals.—The question of determining the location of root-canals, as well as the ability to determine their cleanliness, is of the utmost importance to the dental practitioner. General rules for the location of root-canals may be of service in cases of general type, but exceptions to rules are not infrequent. It sometimes happens that canals are so small as to preclude the introduction of even small-sized bristles; this may particularly occur in the buccal roots of upper molars and in the mesial roots of lower molars. Great difficulties, also, in locating root-canals very frequently present themselves in teeth with

putrescent or gangrenous pulps. In chronic gangrenous cases the occlusal surfaces are very often destroyed, the dentin becomes softened and resolves itself into one mass, and the root-canals seemingly become obliterated. After laboring on such a tooth for a considerable length of time the operator, having tired both himself and the patient, finally discovers that he cannot locate the root-canals, and immediately decides to extract the tooth. Such teeth in the vast majority of cases could have been saved if the canals could have been located and the cleanliness actually determined.

The necessity of resisting the temptation to extract teeth cannot be too strongly emphasized, especially when a cure may be relied upon.

A very useful method for locating difficult root-canals is as follows: After the cavity has been properly excavated, a pellet of cotton is dipped into a 40 or 50 per cent. solution of sulfuric acid and placed into the pulp chamber for one-half to one minute. The rubber dam in this case should be applied. The pellet is then removed and the acid is neutralized by the application of sodium bicarbonate. The cavity is then syringed with water and dried. Another pellet of cotton is dipped into tincture of iodin and inserted into the cavity. This pellet is also allowed to remain there for from one-half to one minute. Upon removing the pellet, the appearance of black spots will indicate the orifices of the root-canals. The purpose of the sulfuric acid is to dissolve all débris and disintegrated matter, clearing the orifices, while the tincture of iodin stains the orifices black, thus rendering them readily noticeable.—J. A. KLEIN, *The Acorn.*

A Dental Surgery in a Factory.—Realizing that much of the ill-health of those employed in factories is due to bad condition or loss of teeth, and with the object of protecting their employees from unqualified practitioners, the directors of a Bristol firm have established a dental surgery in their factory. A qualified dental surgeon is in charge, assisted by a nurse, and every opportunity is given for the work to be carried out in the most efficient manner possible.

The department consists of a well-lighted surgery, waiting and recovery rooms, and a mechanical laboratory for the manufacture of artificial dentures. Treatment is free during working hours for all members of the staff and employees; the only condition imposed is that the advice of the dental surgeon shall be accepted. Ordinary extractions and fillings are free, but where a filling of gold is required the cost of the gold has to be borne by the patient, and if gas is needed for extraction a charge of 6d. is made. All artificial plates are supplied at cost price.

All candidates for employment in the factory are required to pass the dentist, and no one is permitted to commence work until the requirements prescribed have been carried out. The employees undergo a half-yearly examination, records of which are carefully preserved.

The following figures, supplied through the kindness of the firm, give some idea of the work carried on during the last twelve months:

Number of visits by employees	6,490
Extractions (ordinary)	1,691
Extractions (gas)	2,760
Gas administrations	800
Fillings	518
Fillings (gold)	6
Scalings	60
Crowns	10
Artificial plates	288

Tooth-brushes are supplied at 2d. each and tooth-powder at 1d. per tin. The sale of these has amounted to about 2000 brushes and 5000 tins of powder.

Great difficulty has been encountered in persuading the younger employees to have teeth filled and not extracted—another comment upon the influence of the unqualified practitioner, who for obvious reasons prefers the extraction to the filling—but the prejudice is being overcome, and the dental surgeon reports that there is an increasing number of those who wish for the conservative work.—*The Hospital,* per *British Dental Journal.*

The Constitution of Metals.—The mysteries of cohesive gold fillings, the behavior of certain metallic alloys or mixtures, and the anomalous results of pressure casting have led Dr. W. Rosenhain and Mr. D. Ewen to advance a theory on intercrystalline cohesion, which is as follows:

The theory is that the crystals of which metals are built up are held or "cemented" together by an extremely thin layer of amorphous or non-crystalline material chemically identical with the substance of the metal or alloy in question, but in a widely different physical state. The amorphous condition of this intercrystalline layer is regarded as being identical with or at least closely analogous to the condition of a very greatly undercooled liquid, which has re-

mained in that condition in the minute interstices which occur where adjacent crystals meet one another in various orientations. The curve connecting temperature and strength of such a material would naturally be continuous, while that of crystallizing material would show a discontinuity at the crystallizing point, and the two curves would intersect at a point corresponding to some temperature below the crystallizing temperature. This indicates that at the temperature corresponding to the point of intersection the cement and the crystals have the same strength, but that at other temperatures one or other would be more considerably affected under strain. If the intersection temperature and the solidifying temperature of a metal or alloy are wide apart, then at temperatures just below the solidifying point one should find the cement considerably weaker than the crystals, and under fracture, at least for slow straining, the fracture should not only be of the intercrystalline type, but should occur without any material deformation of the crystals themselves, even if the crystals are those of extremely ductile metals.

It is pointed out that the general fact that all metals become extremely weak and brittle at temperatures near their melting-points is thus explainable by the amorphous cement theory.

The authors discuss the question as to whether the intercrystalline material may not consist of films of eutectic alloys formed with traces of impurities in the metals, but consider the evidence to be much more favorable to the theory they advance.—*British Dental Journal.*

OBITUARY.

DR. JOSEPH BAUER.

Died, March 8, 1914, in New Orleans, La., in his sixty-eighth year, Joseph Bauer, D.D.S.

Dr. Bauer was born in St. Louis, Mo. After having studied dentistry in Paris, he came to New Orleans, La., as a young man to practice his profession. His ability was soon recognized, and at the time of his retirement from active practice, about six years ago, his *clientèle* was a very large one.

Dr. Bauer was at one time president of the state dental examining board and lecturer at the New Orleans College of Dentistry. He was also a member of the Louisiana State Dental Society, of the old Academy of Stomatology of New Orleans, the Second Congressional District Dental Association, and others. His great interest in art and literature is evidenced by his membership in the Louisiana Historical Society, where his authoritative knowledge on ancestry of the South and Louisiana was greatly appreciated. His collections of bronzes and old books was a very notable one, and literary men, artists, and sculptors were among his intimate friends.

Dr. Bauer was married to Miss Thibodeaux, of a famous Southern family; his second wife was Miss Hortense Villavaso. A son, Joseph Bauer, Jr., of Chicago, Ill., survives him.

Interment was made at St. Louis Cemetery No. 3.

DR. HENRY CABELL JONES.

Died, February 9, 1914, in Richmond, Va., in his sixty-fifth year, Henry Cabell Jones, D.D.S.

Dr. Jones was born in Richmond, Va., on December 14, 1849. He received his early education at Strothers Academy in his native city, and later attended school in Cincinnati, Ohio. He studied medicine at the Medical College of Virginia, and was graduated in dentistry at the Baltimore College of Dental Surgery in 1872.

Being devoted to military affairs, he enlisted in the Walker Light Guard, company B, Virginia Volunteers, and rose through all the subordinate offices to the captainship; he was subsequently made colonel of the First Regiment Virginia Volunteers, in which position he served for many years.

He was director-general of the first agricultural and mechanical exposition held in Richmond, and for many years was president of

the Mechanics' Institute of that city. He was the principal organizer of the dental department of the Medical College of Virginia, in 1897, and was the first dean of that department, which position he held for a number of years.

His industry and love for his work were such that for many years he rarely left his office until long after office hours, and such was his endurance that he often boasted that he was never tired.

His genial, kindly manners, his well-known sincerity, his high mental endowments, and his great personal magnetism won for him the respect and love of his numerous patients and his host of friends.

His skill as a dentist was of the highest type, and he numbered among his patients the representative people of Richmond, of Virginia, and other states. On the other hand, no person was too humble or lowly to evoke his sympathy and tender care.

"IN MEMORIAM" RESOLUTIONS.

Dr. F. J. S. Gorgas.

Whereas, Almighty God in his infinite wisdom has seen fit to remove from the scene of his earthly labors our esteemed colleague Dr. F. J. S. Gorgas; and

Whereas, The Maryland State Dental Association, of which he was an honored member, recognizing his great worth as a contributor to the literature of his profession and as a teacher, desires to record its appreciation of him as a man and its sense of sorrow at his death; therefore,

RESOLVED, That the members of this association extend to the family of the deceased their sincere sympathy in their bereavement, and that this resolution be spread upon the minutes of the Maryland State Dental Association, and that it be forwarded to the dental journals for publication.

F. F. DREW,
B. MERRILL HOPKINSON,
W. H. BAISH,
Committee.

Brief Necrology.

Dr. GEORGE BENTON WRIGHT of Auburn, N. Y., on April 14, 1914, in his eighty-seventh year.

Dr. JABEZ M. CAIN of San Antonio, Texas, on April 3, 1914, of acute indigestion, in his fifty-fourth year.

Dr. SIMEON B. COOK of Chattanooga, Tenn., on April 22, 1914. Deceased was a graduate of the Ohio College of Dental Surgery.

Dr. MARK M. HAM of Gainesville, Ga., on April 9, 1914, of apoplexy. Deceased was a graduate of the Philadelphia Dental College.

Dr. VERE M. CHAPPELL of Knightstown, Ind., on April 21, 1914, in his thirty-fifth year. Deceased was a graduate of the Indiana Dental College.

Dr. JOHN B. BROWN of Bloomington, Ill., on March 22, 1914, of cancer of the stomach, in his fifty-seventh year. Deceased was a graduate of the Philadelphia Dental College.

Dr. WILLIAM ENDLICH of Philadelphia, Pa., on February 27, 1914, in his fifty-fifth year. Deceased was a graduate of the dental department of the University of Pennsylvania and the Jefferson Medical College.

Dr. SAMUEL T. KIRK of Kokomo, Ind., on April 12, 1914, of diabetes, in his seventy-sixth year. Deceased was a member of the Indiana State Dental Society, and one of the founders of the Indiana Dental College at Indianapolis.

Dr. T. G. THOMPSON of Cavalier, N. D., on March 24, 1914, of apoplexy, in his forty-sixth year. Deceased was a graduate of the Northwestern University Dental School. He was a member and at one time president of the North Dakota Dental Association.

Dr. FRANK L. SIBLEY of Rochester, N. Y., on March 4, 1914, in his forty-fifth year. Deceased was a graduate of the dental department of the University of Buffalo, and member of the Dental Society of the State of New York and the Seventh District Dental Society.

Dental Legislation.

THE DENTAL LAW OF VIRGINIA.

AN ACT

To define Dentistry, to regulate the Practice of the same, and to provide Penalties for the violation of the provisions of this Act, and to repeal an Act entitled "An Act to define Dentistry, to regulate the Practice of the same, and to provide Penalties for the violation of this Act," approved March 14, 1910.

1. Recognizing that dentistry is a specialty of medicine and surgery; therefore, be it enacted by the General Assembly of Virginia:

Section 1. (a) That after this act goes into effect, any person shall be said to be practicing dentistry within the meaning of this act who uses the words "dentist," "dental surgeon," the letters "D.D.S." or other letters or title in connection with his name which in any way represent him as engaged in the practice of dentistry, or shall advertise or permit to be advertised by sign, card, circular, handbill, newspaper or otherwise, that he can or will attempt to perform operations of any kind; or who shall diagnose or profess to diagnose, or treat or profess to treat, any of the diseases or lesions of the oral cavity, teeth, gums, maxillary bones, or shall extract teeth, or shall prepare to fill cavities in human teeth, or shall correct malposition of the teeth or jaws, or shall supply artificial teeth as substitutes for natural teeth, or shall administer anesthetics, general or local, or do any practice included in the curricula of recognized dental colleges: provided, that nothing in this act shall interfere with the performance of mechanical work on inanimate objects only, by any person employed in or operating a dental laboratory, and provided, that this act shall not prevent students from performing dental operations under the supervision of competent instructors within a dental school or college, or the dental department of a university or college, recognized by the Virginia State Board of Dental Examiners.

(b) It shall be unlawful for any person to engage in the practice of this specialty, as either assistant or employee, or to receive a license from any commissioner of the revenue to practice this specialty, except he shall have passed the examinations provided for by this act, and received the certificates hereinbefore provided; and any person practicing this specialty in this state without having passed the examinations and received a certificate as herein provided, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than one hundred dollars ($100) nor more than two hundred and fifty dollars ($250), for the first offense, and for the second offense a fine of not less than five hundred dollars ($500), or imprisonment of from three to twelve months in jail, or both, in the discretion of the court. Nor shall such person receive any compensation for services rendered by him: provided, that nothing contained in this section shall prevent any licensed physician or surgeon or other person from extracting teeth for anyone suffering from toothache.

CREATION OF STATE BOARD OF DENTAL EXAMINERS.

Sec. 2. *Board of Examiners; their appointment and terms.*—The board of examiners shall consist of six practitioners of dentistry of acknowledged ability in the profession, to be appointed by the governor. This board shall continue to be divided into three classes of two members each, one of which classes shall go out of office each succeeding year, and the governor shall annually appoint the successors of each class as it goes out, for the

term of three years. He shall make the appointment in each case from four persons who shall be nominated by the Virginia State Dental Association and reside in different sections of the state. All vacancies for unexpired terms shall be filled by the governor on nominations made by the board of examiners. If no nominations be made by the said board of examiners or association, the governor shall appoint such persons as he may deem fit.

DUTIES AND POWERS OF BOARD.

SEC. 3. (a) Said board shall choose a president and secretary, and it shall meet at least once in each year, or oftener if necessary, in the discretion of the board, and at such times and places as it may deem proper. A majority of members of said board shall, at all times, constitute a quorum for the transaction of the business of the board, and the proceedings thereof shall, at all reasonable times, be open to public inspection.

(b) Said board shall have full power to make by-laws and necessary regulations for the proper fulfilment of their duties under this act.

EXAMINATION OF APPLICANTS.

(c) The said board shall grant a certificate of ability to practice dentistry to all applicants who undergo a satisfactory examination and receive at least four affirmative votes. This certificate shall be signed by the members of the board and be stamped with a suitable seal which they may adopt.

(d) The said board shall keep a book in which shall be registered the name and qualifications of every person to whom such certificate is granted.

(e) The said board shall inquire into the qualifications and truthfulness of representations of any applicant for a license to practice dentistry, and for such purposes shall have power to send for witnesses, papers, and documents, and administer oaths.

TRANSCRIPTS FROM RECORD BOOK, EVIDENCE, ETC.

(f) The book provided for by section three (d) shall be a book of record, and transcripts from it, certified by the officer who has it in keeping, with seal of the board affixed, shall be evidence in any court of this state.

EXAMINATIONS FOR LICENSES.

SEC. 4. No person, unless previously licensed or registered to practice dentistry in this state at the time this act shall become operative shall begin the practice of dentistry, or any branch thereof, without first applying for and obtaining a license for such purpose from the Virginia State Board of Dental Examiners.

Applications shall be made to the said board in writing, and shall be accompanied by the examination fee of ten dollars ($10).

The applicant must be of good moral character and twenty-one years of age, or over, at the time of making the application. Application from a candidate who desires to procure a license from said board to practice dentistry in this state shall be accompanied by satisfactory proof that the applicant so applying for license is a graduate of, and has a diploma from, the faculty of a reputable dental college, school or dental department of a reputable university or college, or has been engaged in the actual legal and ethical practice of dentistry in some other state or country for five consecutive years just prior to application. Examinations may be made orally or in writing, in whole or in part, at the discretion of the board, and shall be of such character as to test the qualifications of the applicant to practice dentistry. The said board shall, within thirty days from the beginning of the examination, notify each applicant of the action of the board on his examination.

REGISTERING LICENSES.

SEC. 5. Any person licensed to practice dentistry in this state by the Virginia State Board of Dental Examiners, as hereinbefore provided, shall, within ninety days from the date of issue, cause such license to be registered in the office of the clerk of the circuit court of such county or counties, or in the office of the clerk of the corporation court of such city or cities in which such person desires to engage in the practice of dentistry; provided that should such dentist remove to another county or city he shall record his certificate in said office of said clerk before beginning the practice of dentistry.

And it is hereby provided, further, that every person who engages in the practice of dentistry in this state shall cause his or her license to be registered with said clerk, or clerks, before beginning the practice of dentistry in said county or city.

SEC. 6. It shall be the duty of the secretary

of the board to mail to each person whose name appears upon the register of said board, on or before April first of each year, a printed blank form to be filled out by such person, which form shall be returned to the secretary of the board properly filled out, together with the fee of one dollar ($1), and shall receive therefor a registration certificate stamped with the seal of the board. Any commissioner of revenue who shall, in violation of this section, issue a license to any person who has not complied with this section by filing such renewal certificate in his office shall upon conviction thereof be deemed guilty of a misdemeanor, and, upon conviction thereof, be fined not less than twenty dollars ($20), nor more than fifty dollars ($50), and no license issued by any commissioner of revenue in violation of this section shall be valid.

SEC. 7. Whenever it shall appear to the Virginia State Board of Examiners that any licensed dentist practicing in the state of Virginia has been guilty of fraud, deceit, or misrepresentation in obtaining a license, or of gross immorality, habitual use of intoxicants or drugs, rendering him unfit for the practice of dentistry; or of malpractice, gross ignorance, incompetency, or wilful negligence in the practice of dentistry; or of employing unlicensed persons to perform work which under this act can only be legally done by persons holding a license to practice dentistry in this state; or of committing any crime involving moral turpitude or of practicing deceit or other fraud upon the public or individual patients in obtaining, or attempting to obtain practice; or of false advertisement, publication, or circulation of false claims or fraudulent misleading statements of his art, skill or knowledge, or of his methods of treatment or practice, they shall revoke the license of such person.

SEC. 8. An accusation may be filed with the secretary of the Virginia State Board of Dental Examiners charging any licensed dentist with the commission of any of the offenses enumerated in the preceding section. Such accusation shall be in writing, signed by the accuser, and verified under his oath.

Whenever such accusation is filed, the secretary of the State Board of Dental Examiners shall set a day for hearing, and shall transmit to the accused a true copy of all papers filed with him relating to such accusation, and shall notify the accused that on the day fixed for hearing he may appear and show cause, if any, why his license to practice dentistry in the state of Virginia should not be revoked.

And for the purpose of such hearing, the State Board of Dental Examiners is hereby empowered to require the attendance of witnesses, administer oaths, and hear testimony, either oral or documentary, for and against the accused.

And if, after such hearing of the accused, the state board shall be satisfied that the accused has been guilty of the offense charged in the accusation, they shall thereupon, without further notice, revoke the license of the person so accused.

SEC. 9. The governor, the superintendent of public instruction, and the secretary of state shall be, and they are hereby constituted a board of review, with power and authority to review any and all actions of the board of examiners in revoking or refusing to revoke any such license; and the determination of the said board of review upon any and all matters submitted to it shall be final.

Any person who may feel himself aggrieved at the revocation of his license may have the action of the state board in revoking the same reviewed by the board of review in the following manner:

The person seeking such review shall file with the secretary of the board of examiners his affidavit, verified in the manner required by law, setting forth the fact of the revocation of his license, and that there has been a miscarriage of justice, or error committed by the state board, or that the decision of the state board was contrary to law, or was not supported by the evidence adduced at the hearing.

REGULATING DENTAL CORPORATIONS.

SEC. 10. Any association, or company of persons, whether incorporated or not, who shall engage in the practice of dentistry under the name of company, association, or any other title, shall cause to be displayed and kept in a conspicuous place at the entrance of its place of business, the name of each and every person employed in said company or association in the practice of dentistry, and everyone so employed by said company or association whose name shall not be so displayed as above provided, and the said association or company, if incorporated, or the

person comprising the same if not incorporated, shall, for the failure to display the aforesaid names, be deemed guilty of a misdemeanor, and upon conviction thereof each shall be punished by a fine of not less than one hundred dollars ($100) nor more than two hundred and fifty dollars ($250) for each offense.

Any manager, proprietor, partnership, association, or incorporation, owning, running, operating, or controlling any room or rooms, office, or dental parlors where work is done, provided or contracted for, who shall employ, keep, or retain any unlicensed person or dentist as an operator; or who shall, within ten days after demand made by the secretary of the Virginia State Board of Dental Examiners, in writing, sent by registered mail, addressed to any such manager, proprietor, association or corporation, at said rooms, office, or dental parlors, fail to furnish to said secretary the names and addresses of all persons practicing or assisting in the practice of dentistry in his place of business, or under his control, together with a sworn statement showing by what license or authority said persons are practicing dentistry, shall be guilty of a misdemeanor, and, upon conviction thereof, subject to penalties provided for in this act: provided, however, that such sworn statement shall not be used as evidence in any subsequent court proceedings.

SEC. 11. Every person, or persons, or corporation who is the proprietor of, or who controls any dental office or parlors, doing business in this state, shall promptly report to the State Board of Dental Examiners the name or names of all registered dentists in his employ, together with their place of residence, and when said registered dentists shall leave the employ of such person, persons, or corporations aforesaid, said facts shall be promptly reported to the State Board of Dental Examiners.

Any failure to comply with this section shall be deemed a misdemeanor and subject to a fine of twenty-five dollars ($25) upon conviction.

SEC. 12. The secretary of the board of dental examiners shall, thirty (30) days before the annual meeeting of the Virginia State Dental Association, file with the president of the said association an itemized statement of all moneys collected and expended by the said board, and the said statement shall be laid before the said association at the following annual meeting thereof.

SEC. 13. Be it further enacted by the General Assembly of Virginia, that an act approved March fourteenth, nineteen hundred and ten, entitled "An Act to define Dentistry, to regulate the Practice of the same, and to provide Penalties for the violation of this Act," be, and the same is, hereby repealed.

[Approved March 27, 1914.]

DENTAL COLLEGE COMMENCEMENTS.

COLORADO COLLEGE OF DENTAL SURGERY.

THE annual commencement exercises of the Colorado College of Dental Surgery were held on Thursday, June 4, 1914, in Denver, Colo.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Paul A. Barker	Joe A. Gavette	George S. Mason	James L. Shepard
Earl P. Beardsley	Jackson J. Gunnell	Wm. J. Ould	Walter K. Shoemaker
Frank L. Beckley	John L. Hartman	Charles M. Rhein	Frank Silverberg
Ernest E. Boyd	Royal E. Hubbard	John E. Riley	Sam Silverberg
Arthur J. Brooking	Ralph J. Inman	Glenn W. Richards	Ray C. Van Aken
Herbert F. Bush	Henry L. La Croix	Clark W. Russell	Leo B. Walsh
Robert L. Edwards	Vincent E. Larrick	Charles M. Scholl	Glenn H. Whitson
Clyde C. Englund	Fred C. Luke	Reno R. Schroeder	

TEXAS DENTAL COLLEGE.

THE annual commencement exercises of Texas Dental College were held in Houston, Texas, on Friday, May 22, 1914.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Ernest T. Belbeze	Johnnie B. Castille	Kenneth W. Mayo	Rawley S. Tinsley
John R. Berndt	Chester C. Chandler	Robert D. Perkins	Reuben A. Wansley
Otto F. Bock	Max A. Cohn	Henry H. Plaster	Charles H. Wedemeyer, Jr.
George H. Brown	Roy L. Denson	Walter Rehrauer	Victor Elmer Wratten
Murry McG. Bundy	J. Edwin Hymes	Wilbur E. Sutton	

UNIVERSITY OF CALIFORNIA, COLLEGE OF DENTISTRY.

THE fifty-first annual commencement exercises of the University of California, Dental Department, were held in the Greek Theater, Berkeley, Cal., on May 13, 1914.

The degree of Doctor of Dental Surgery was conferred, by the president of the university, on the following graduates:

Arthur Barr	California
Dickson G. Bell	California
Harold A. Boalt	California
Raymond E. Brownell	California
Arthur A. de Carvalho	China
James A. Cunha	California
Fred N. Eaton	California
Henry O. Eggert	California
Clarence A. Flanagan	California
John E. Frates	California
Clark R. Giles	Oregon
Felix D. Herd	California
Eldridge L. Hicok	California
Lars J. Jacobsen	California
Leland S. Jones	California
Reinhart W. McCluskey	California
Theodore C. Muegge	California
Herbert P. Peck	California
Henry C. Petray	California
Wilke R. Renwick	California
William E. Rideout	California
William E. Ross	California
Homer L. Sams	California

NORTH PACIFIC COLLEGE.

THE annual commencement exercises of North Pacific College were held on Wednesday evening, May 20, 1914, in the First Baptist Church, Portland, Ore.

Addresses were delivered by Dr. Chas. J. Smith and Dr. Luther R. Dyott.

The degree of Doctor of Dental Medicine was conferred by the president, Dr. Herbert C. Miller, on the following graduates:

Fred J. Beauchene	Vitalles A. Earlywine	William C. Holland	Frederick J. Richmond
James A. Campbell	Frank H. Entriken	Orlando J. Johnson	George R. Ross
Albert E. Clarke	James J. Frits	Frank G. Keene	Lester C. Smith
Hugh Clarke	Harold C. Gill	Earl J. Kiesendahl	Carl L. Stanley
Veron A. Clemans	Hugh Gillis	Harry A. Labby	Charles M. Taylor
Samuel M. Cohen	Ray S. Goodwin	J. Orlan Lasher	LeRoy A. Thomson
Frank A. Cozza	R. Jay Greer	Anna M. Lowman	M. V. Tidball
John H. Cudlipp	Carl E. Hall	Aubrey L. Martin	Louis P. Waidt
William R. Dinham	Edward Hall	Albert H. Meadowcroft	Edna D. Warren
Royal W. Donohoe	Jay W. Herns	Roland B. Miller	Virgil D. Wescott
Aubrey S. Doyle	Theodore Hetu	Wilfred A. Norby	Leland S. Whetstone
Harry R. Draney	Meriden C. Hill	Patrick J. O'Donnell	Earl G. Wisecarver
William E. Driskell	George M. Hoffman	William H. Olson	Frank E. Wood
Ross W. Earlywine	William A. Holden	Ralph E. Plummer	Neal L. Zimmerman

UNIVERSITY OF SOUTHERN CALIFORNIA, COLLEGE OF DENTISTRY.

The sixteenth annual commencement exercises of the College of Dentistry, University of Southern California, were held on Thursday morning, June 11, 1914, in the Temple auditorium, Los Angeles, Cal.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Loren W. Ayres
Seth H. Baba
James P. Black
Edward R. Brownson
Harve E. Cannon
Ray M. Champion
Frederick P. Dennis
Charles V. Doty
Gerald Q. Farwell
George W. Henry
Homer C. Humes
Kaichiro Iwata
Yorick Kikuchi
Frederick C. Kloeppel
Rufus Knight
Edwin F. Lee
Charles R. Lusby
William H. McCabe
John T. Parker, Jr.
Alan C. Prather
Clinton P. Ratliff
Austin F. Roberts
George H. Schildwachter
Percy P. Sewell
Hugh C. Smith
Wendell J. Spencer
Frank G. Staley
Fay G. Stone
Vaughan A. K. Tashjian
Walter G. Tedford
Emil F. Tholen, M.D.
Frederick W. Tuttle
John G. Washburn
Robert L. Watson
Carlyle B. Worthy
Frederick R. Yoshida
Ralph LeR. Young

BALTIMORE COLLEGE OF DENTAL SURGERY.

The seventy-fourth annual commencement exercises of the Baltimore College of Dental Surgery were held in Albaugh's Theater, Baltimore, Md., Tuesday, May 19, 1914.

The annual oration was delivered by Hon. Isaac Lobe Straus, and the valedictorian was J. J. Corley.

The degree of Doctor of Dental Surgery was conferred by Prof. M. W. Foster, dean, on the following graduates:

G. H. Abernethy .... North Carolina
A. Alberni .... Cuba
R. J. Bumpass .... Texas
S. O. Burns .... New Jersey
S. E. Butler .... North Carolina
D. B. Casto .... West Virginia
G. A. Cloutier .... Maine
J. J. Corley .... Vermont
W. C. Cormley .... West Virginia
L. A. Crisp .... Virginia
L. A. Davis .... Maryland
R. L. Davison .... Canada
H. A. Dochelli .... Connecticut
J. C. Doore .... Canada
G. Fernos .... Porto Rico
P. Fields .... North Carolina
A. J. Fletcher .... Massachusetts
O. E. Gilpatrick .... Maine
J. H. Harrison .... Pennsylvania
B. Herron .... West Virginia
R. J. Hill .... Massachusetts
W. M. Hollingsworth .... North Carolina
F. H. Huff .... New Jersey
H. W. Huff .... New Jersey
S. V. Hughes .... Massachusetts
T. B. Hunter .... Virginia
F. P. Laffin .... Maine
C. H. Layman .... West Virginia
G. A. Lyon .... Venezuela
F. P. McBride .... Massachusetts
N. H. McDonald .... Connecticut
G. E. A. McFarland .... Maryland
D. V. McRae .... Canada
R. McWhorter .... West Virginia
D. M. Martin .... West Virginia
O. T. Miller .... Alabama
J. H. Monserrat .... Porto Rico
J. F. O'Connell .... Connecticut
T. L. O'Connell .... Massachusetts
R. J. O'Neil .... Michigan
W. O'Shea .... Massachusetts
W. E. Paul .... West Virginia
R. S. Payne .... Virginia
B. G. Redden .... Canada
M. E. Sawtell .... Massachusetts
R. S. Schlosser .... Maryland
O. Schwalb .... New York
R. T. Turcotte .... Maine
C. E. Valiquette .... Canada
H. Vannatta .... New Jersey
H. S. Wilson .... New Jersey
E. J. Wohrna .... Maryland
H. A. Wright .... West Virginia
A. D. Young .... Connecticut
O. C. Yount .... Pennsylvania

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS: July and August.

JULY.

American Dental Society of Europe. Paris. July 30th to August 1st.

American Society of Orthodontists. Toronto, Can. Three days: July 2d to 4th.

Delta Sigma Delta Fraternity. Rochester, N. Y. July 6th.

Florida State Dental Society. Atlantic Beach. Three days: July 1st to 3d.

National Association of Dental Examiners. Rochester, N. Y. July 6th.

National Dental Association. Rochester, N. Y. Four days: July 7th to 10th.

New Jersey State Dental Society. Ocean Grove. Four days: July 15th to 18th.

Pennsylvania State Dental Society. Philadelphia. Three days: June 30th and July 1st and 2d.

Tri-State Dental Association [District of Columbia, Maryland, and Virginia]. Buckroe Beach, Va. Three days: July 23d to 25th.

Virginia State Dental Association. Old Point Comfort. Three days: July 1st to 3d.

Wisconsin State Dental Society. Three days: July 14th to 17th.

Xi Psi Phi Fraternity National Alumni Association. Rochester, N. Y. July 6th.

AUGUST.

Minnesota State Dental Associatiqn. Duluth. Three days: August 6th to 8th.

Sixth International Dental Congress. London, Eng. Six days: August 3d to 8th.

Examiners' Meetings.

Arizona Board of Examiners. Phoenix. October 5th.

Idaho Board of Examiners. Boise. July 1st.

Montana Board of Examiners. Helena. July 13th to 17th.

North Dakota Board of Examiners. Fargo. July 13th to 16th.

Rhode Island Board of Registration. Providence. July 1st to 3d.

South Dakota Board of Examiners. Sioux Falls. July 7th.

PENNSYLVANIA STATE DENTAL SOCIETY.

The forty-sixth annual meeting of the Pennsylvania State Dental Society will be held at the Bellevue-Stratford Hotel, Philadelphia, on June 30, July 1 and 2, 1914.

Luther M. Weaver, *Sec'y*,
7103 Woodland ave., Phila.

AMERICAN SOCIETY OF ORTHODONTISTS.

The annual meeting of the American Society of Orthodontists will convene in Toronto, Can., July 2, 3, and 4, 1914.

Wm. Ernest Walker, *Sec'y*,
629-31 Maison Blanche, New Orleans, La.

AMERICAN DENTAL SOCIETY OF EUROPE.

Annual Meeting—Paris, July 30th.

The forty-first annual meeting of the American Dental Society of Europe will be held in Paris, France, July 30, 31, and August 1, 1914, at the Hotel Continental. All members of the profession are cordially invited to be present.

G. B. Hayes, *Sec'y*.

NATIONAL MOUTH HYGIENE ASSOCIATION.

A series of illustrated lectures on Mouth Hygiene is being prepared by this association for rental service. The first lecture of the series, a talk suitable for a mixed adult audience or school pupils above the age of twelve years (designated as lecture "A") is now ready. The lecture set (manuscript and 36 slides) will be furnished to members of state dental societies and others who may be considered as competent to present the matter to the public, at a fee of One Dollar per use.

For further particulars and application blanks, address the Director of Extension Lectures,

Edwin M. Kent, D.M.D.,
222 Washington st., Brookline, Mass.

National Dental Association Meeting.

Rochester, N. Y., July 7–10, 1914.

THE National Dental Association will hold its 1914 meeting in Rochester, N. Y., July 7 to 10, 1914. The House of Delegates will hold its first session on Monday, July 6th, at 11 A.M., and it is important that all delegates be present at this time.

The first general session will open at 11 A.M. on Tuesday, and the Local Committee have hopes that Governor Glynn will be present to make the address of welcome. This will be responded to by Dr. B. Holly Smith, Baltimore, Md. The President's address will be followed by an address by Dr. Victor C. Vaughan, president Amer. Med. Association.

The second general session will be held in Convention Hall, at 8 P.M. Tuesday, and will be a symposium by the Research Commission, with Drs. Weston A. Price, Thomas B. Hartzell, and Russell W. Bunting as speakers. At the Wednesday evening general session Dr. Joseph C. Bloodgood, M.D., of the Johns Hopkins University, will discuss "The Early Recognition of Pre-cancerous Lesions of the Mouth and Tongue." At the Thursday evening general session two selected papers will be presented from Sections I and III.

Tentative Program.

The program for the section meetings has not been entirely completed, and two or three papers will be added to the following list:

Dr. J. R. Callahan, Cincinnati, Ohio: "Some Phases of Root-canal Treatment."

Dr. W. H. DeFord, Des Moines, Iowa: "Some Phases of Eliminating Pain."

Dr. E. J. Eisen, Milwaukee, Wis.: "Dental Radiography."

Dr. Herbert L. Wheeler, New York City: Subject to be announced.

Dr. Fred W. Gethro, Chicago, Ill.: Subject to be announced.

Dr. J. D. Patterson, Kansas City, Mo.: "Pyorrhea Alveolaris."

Dr. C. H. Oakman, Detroit, Mich.: "Oral Hygiene."

Dr. Chalmers J. Lyons, Ann Arbor, Mich.: "The Pathological Significance of Impacted Teeth."

Dr. Dayton Dunbar Campbell, Kansas City, Mo.: "Some Basic Principles and Methods in the Reproduction of Mandibular Movements."

Dr. Wm. A. Giffin, Detroit, Mich.: "Technique for Making Impressions and Models for the Construction of Artificial Dentures." (Demonstrated with motion pictures.)

Dr. A. J. Bush, Columbus, Ohio: "Classification of Fixed Bridge Work, with Law Governing Its Application."

Dr. Carl B. Case, Milwaukee, Wis.: "Evolution of Root Movement."

Dr. Jules J. Sarrazin, New Orleans, La.: "Properly Constructed Bridges and Their Hygienic Care."

Dr. Homer C. Brown, Columbus, Ohio: "The Responsibilities of the State Society Officers."

Dr. Otto U. King, Huntington, Ind.: "The Business Side of the State Society Work."

The Clinic Committee is to present a Progressive Clinic, Wednesday morning, commencing at 9.30. They have secured a list of exceptionally high-class clinicians for both the progressive and the general clinic. The general clinic will be given Friday morning.

The Local Committee has selected the Powers Hotel as headquarters, and reservations should be made as early as possible. A full list of hotels and rates will appear in the National *Bulletin*. This committee has made ample provisions for a large meeting.

All reputable practitioners of dentistry and medicine are cordially invited to attend this meeting.

HOMER C. BROWN, *President*.
Columbus, Ohio,
OTTO U. KING, *General Sec'y*,
Huntington, Ind.

FROM THE LOCAL COMMITTEE OF ARRANGEMENTS.

LETTERS from those in charge come to us frequently telling of the success they are having in securing as essayists and clinicians the ablest men from our profession, as well as from the medical profession.

A thing not to be lost sight of in the coming National meeting is the unusual facilities that are offered by Exposition Park. The buildings are either of stone or brick construction, were built especially for convention use, adjoin one another, provide ample space for all requirements, and are scientifically ventilated and mechanically cooled.

Exposition Park has forty-five acres of well-kept, beautifully grassed lawns, with buildings having 100,000 square feet of floor space, and yet is in the heart of the city and not more than ten minutes' ride from headquarters at Powers Hotel and fifteen minutes from all other hotels.

For the accommodation of those who attend the National meeting we are planning to secure a competent chef for the restaurant that is located on the grounds for noonday luncheons.

All of the morning and afternoon sessions will be held at the Park, and so arranged that there will be opportunity for each and every one to take advantage of the many good things that will be offered. The evening sessions will be held at Convention Hall.

Any of the following hotels will assure you of courteous and satisfactory treatment: *Powers Hotel. *Seneca Hotel. *Hotel Rochester. *Hayward Hotel. Whitcomb House. New Osborn House. Eggleston Hotel. Hotel Bristol. Clinton Hotel. (The * indicates first-class hotels.) Rates in the first-class hotels are from $1.25 up, European plan; other hotels, $0.75 and up, European plan; $2.00 and up, American plan.

These rates are for two in a room, and we advise early reservations.

EDWARD G. LINK, *Chairman*,
226 Cutler Bldg., Rochester, N. Y.
WILLIAM W. SMITH,
BENEDICT S. HERT,
LOUIS MEISBERGER,
CHAS. L. BRININSTOOL.

FROM THE TRANSPORTATION COMMITTEE.

Railway Passenger Rates To and From ROCHESTER, N. Y.

Trunk Line Association—covering New York State (east of and including Buffalo, Niagara Falls, and Salamanca) New Jersey, Pennsylvania (east of and including Erie, Oil City, and Pittsburgh) Delaware, Maryland, District of Columbia, Virginia, and West Virginia (east of and including Wheeling, Parkersburg, and Huntington)—have given an open rate of two cents per mile in each direction in their respective territories, with the minimum excursion rate of $1. Tickets to be sold and good going July 5th to 7th, and returning to reach original starting-point not later than July 13, 1914.

New England Passenger Association—covering the railways of New England—also grant the above privileges and limitations with tickets from their principal stations. The agent at other stations will require not less than forty-eight hours' notice to procure fares and tickets obtainable from the general passenger department of the railroad.

Eastern Canadian Passenger Association—(Canada east of and including Port Arthur, Sault Ste. Marie, and St. Clair and Detroit rivers) declined granting reduced fares.

Central Passenger Association—territory west of Buffalo, Pittsburgh, Wheeling, Parkersburg, and Huntington to and including Chicago and St. Louis and north of the Ohio river, including Cincinnati, Louisville, and Cairo—have granted a rate of two cents per mile in each direction added to the tender received from trunk lines—through fares, however not to be higher than the 30-day summer tourist fares to Buffalo, N. Y., plus tender covered.

Signature form of tickets to be sold on July 4th, 5th, and 6th, with return limit to reach starting-point not later than midnight of July 14, 1914, except in border territory common to the trunk lines; selling dates July 5th, 6th, and 7th, with return limit of July 13, 1914. Your committee suggests confer-

ring with the local agent for excursion rate with longer limit, if desired.

Southeastern Passenger Association—territory south of Ohio and Potomac and east of Mississippi rivers—declined granting a concession in rates, and suggest that the summer excursion tickets will be on sale daily before the time of meeting, from principal stations in their territory, reaching Buffalo, Niagara Falls, and other points contiguous to Rochester.

Western Passenger Association—territory west of Chicago, Peoria, and St. Louis to and including Denver, Colorado, and Cheyenne, Wyo.—state that the summer tourist fares to eastern sections will be available from principal points in their territory. The general basis of fares, two cents per mile in each direction to their eastern gateways added to the fares over their lines. Confer with local ticket agents.

Southwestern Passenger Association—territory southwest of St. Louis, including Texas, Arkansas, Oklahoma, Missouri (south of Missouri river), and Louisiana (west of Mississippi river) and Mexico—suggest that the summer excursion rates are practically two cents per mile in each direction. Tickets on sale daily May 5th to September 30th, limited to return October 31st. Confer with local agent.

The territory covered by the *Trans-continental Passenger Association*—Pacific coast and other far-western territory not otherwise covered by the above associations—suggest that the summer excursion rate $72.50 is as low as can be granted from San Francisco to Chicago and return. Sale dates for tickets June 29th–30th, and July 2d–3d.

Excursion tickets from Oregon and Washington to Chicago, daily for June and July.

Convenient Trains to Rochester.

Lv. St. Louis, Mo., Big Four route	11.30 A.M.
Lv. Indianapolis, Big Four route	5.50 P.M.
Lv. Cincinnati, Ohio, Big Four route	6.05 P.M.
Lv. Dayton, Ohio, Big Four route	7.45 P.M.
Lv. Springfield, Ohio, Big Four route	8.30 P.M.
Lv. Columbus, Ohio, Big Four route	9.55 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	9.21 A.M.
Lv. Chicago, Ill., Lake Shore & Mich. So. Ry.	5.30 P.M.
Lv. Toledo, Ohio, Lake Shore & Mich. So. Ry.	11.15 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	8.45 A.M.
Lv. Chicago, Ill., Michigan Central R. R.	5.40 P.M.
Lv. Grand Rapids, Mich., Michigan Central R. R.	5.10 P.M.
Ar. Rochester, N. Y., N. Y. Central R. R.	9.21 A.M.

(Parlor cars and sleepers over these lines reach Rochester via N. Y. Central.)

Through tickets to New York permit stopover of ten days at Rochester by depositing ticket at station ticket office immediately upon arrival—a convenience to those joining the European tour or visiting the metropolis.

From New York to Rochester.

(Excursion tickets sold July 5th–7th, return by July 13th.)

Lv. New York, N. Y., New York Central R. R.	8.30 A.M.	9.34 P.M.	11.35 P.M.
Ar. Rochester, N. Y., New York Central R. R.	4.05 P.M.	6.30 A.M.	8.13 A.M.
Rate to Rochester—excursion both directions	$14.45.		
Lv. New York, N. Y., West Shore R. R.		8.35 A.M.	7.20 P.M.
Ar. Rochester, N. Y., West Shore R. R.		6.40 P.M.	5.12 A.M.
Rate to Rochester—excursion both directions	$13.40.		
Lv. New York, N. Y., Lehigh Valley R. R.	9.50 A.M.	11.50 A.M.	8.50 P.M.
Ar. Rochester, N. Y., Lehigh Valley R. R.		9.44 P.M.	8.25 A.M.
Rate to Rochester—excursion both directions	$13.40.		
For ten or more people, traveling on one ticket	$13.20.		
Black Diamond Express (11.50 A.M.) fare $13.40—Pullman seat $1.75.			

☞ *Confer with local railway agents with reference to excursion rates to Rochester or nearby points, with stopover privileges.*

V. H. JACKSON, *Chairman*, New York, N. Y. H. F. HOFFMAN, Denver, Colo.
L. P. DOTTERER, Charleston, S. C. T. S. SMITH, Palo Alto, Cal.
WM. W. BELCHER, *Sec'y*, Rochester, N. Y.

At Rochester.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The thirty-second annual session of the National Association of Dental Examiners will be held at the Rochester Hotel, Rochester, N. Y., beginning July 6, 1914, at 10 A.M., and continuing until adjournment.

Every state board holding membership in the association is earnestly requested to have at least one representative present at this session. Members of all state boards invited.

Hotel reservations should be made immediately, as the National Dental Association meets in Rochester during the week beginning July 6th, and the attendance undoubtedly will be large.

A. E. Honey, *President*,
Kalamazoo, Mich.,
T. A. Broadbent, *Sec'y*,
15 E. Washington st., Chicago, Ill.

At Rochester.

DELTA SIGMA DELTA FRATERNITY.

The thirtieth annual meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held at the Powers Hotel, Rochester, N. Y., Monday, July 6, 1914, at 10 A.M. Business of importance and initiation has been arranged for the day, followed by the annual banquet in the evening.

By order of the Supreme Chapter.

William D. Tracy, *Supreme Grand Master.*
R. Hamill D. Swing, *Supreme Scribe.*

At Rochester.

XI PSI PHI FRATERNITY NATIONAL ALUMNI.

The next annual meeting of the Xi Psi Phi Fraternity National Alumni Association will be held in Rochester, N. Y., Monday, July 6, 1914. The afternoon entertainment will be under the direction of the Local Committee of Arrangements. The banquet will be held at 6.30 P.M., followed by the business meeting.

The Hotel Seneca will be our headquarters.

Send acceptance to Dr. Geo. C. Lowe, C. of C. Bldg., Rochester, N. Y., so as to secure reservations.

L. M. Waugh, *Pres.* C. O. Simpson, *Sec'y.*

International Exhibition, Lyons, 1914.

ORAL AND DENTAL HYGIENE CONGRESS.

Lyons, France, September 24–28, 1914.

Dear Colleague,—Inasmuch as hygiene in general is rapidly growing in public recognition, it has been deemed most desirable that a Congress of Oral and Dental Hygiene shall form a constituent parc oi the general Hygiene Congress which is to be held in Lyons during the International Exhibition to take place there in September next.

Preparations for this congress are being made under most favorable auspices. The most distinguished scientists are giving it their patronage, and its synchronizing with the great Exhibition organized by the city of Lyons greatly enhances the assurance of success both for the meeting in general and for the special section devoted to the consideration of the oral and dental phases of hygiene.

We desire to appeal to all workers in the field of diseases of the mouth and teeth, believing that—laying aside subjects of professional disputation—we can heartily meet and harmoniously exchange ideas on the subject of oral hygiene, with most profitable results to ourselves and our patients.

The congress will include active members and associate members (members' relatives). Dues have been fixed at 15 fr. for active members and 5 fr. for associates.

Members will be entitled to many privileges. The Transactions, with papers and discussions, will be forwarded to them free of charge. The Committee of Organization is preparing official receptions and festivities and arranging for excursions. A Ladies' Committee will cordially receive our *confrères*' wives and will endeavor to make their stay in Lyons as pleasant as possible.

It is unnecessary to enlarge upon the opportunity presented by this occasion from the professional standpoint. The undersigned, in the name of the Committee of Organization, solicit your enrollment as an active member, and request that you forward your application at your earliest possible convenience, also the title of any paper which you may have to present to the congress, to the general secretary, Dr. J. Vichot, 6 rue de la Barre, Lyons.

With fraternal greetings,

A. Pont, *President*,
J. Vichot, *Gen. sec'y.*

Sixth International Dental Congress.

London, August 3 to 8, 1914.

Patron: HIS MAJESTY THE KING.
President: J. HOWARD MUMMERY, M.R.C.S., L.D.S.

THE Sixth International Dental Congress will be held in London at the University of London and the Imperial College of Science and Technology, South Kensington, S.W.—August 3 to 8, 1914, at the invitation of the British Dental Association.

The British government has issued invitations to foreign governments and to the self-governing Dominions of the Empire to send official representatives to the Congress.

The Committee of Organization (appointed under Art. XVI of the International Dental Federation) has completed the list of the various Sections, Officers, and Subjects for Report and Debate. Offers of papers on subjects other than those selected for reports should be made as soon as possible to the secretaries of the appropriate sections, or to the general secretaries, Messrs. Norman G. Bennett and H. R. F. Brooks.

The International Dental Congress Museum is intended to be representative of every section of the congress.

The Rules make eligible for membership all ethical practitioners of dentistry possessing the qualification of the country in which they received their professional education, or of that in which they practice.

At the closing meeting (Saturday, August 8th) the President will submit the amended constitution of the International Dental Federation to the vote, and will announce the place and date of the next congress.

The subscription for members will be 30s. (38 francs; 31 marks; $7.50); for members of their families accompanying them, 15s. (19 francs; 15½ marks; $3.75).

Subscriptions (by postal order, draft or check) payable to the treasurer Sixth International Dental Congress, who will send a formal receipt. (With application, inclose card, with dental or medical qualifications and titles, and full postal address—any change in which must be immediately notified.)

Members will receive the official program, the daily journal of the congress, the catalogs of the exhibitions, and the Transactions.

Correspondence should be addressed to the Officers of the Congress, as follows:

HON. GENERAL SECRETARIES,
SIXTH INTERNAT'L DENTAL CONGRESS,
19 HANOVER SQ., LONDON, W.

Opening Meetings.

Tuesday, August 4th, at 10 A.M. Formal opening and general session in the Central Hall, Westminster.

Tuesday, at 2 P.M. Scientific addresses at the afternoon session: France, Dr. M. Roy; Germany, Professor Walkhoff; United Kingdom, Mr. W. Guy. United States, Dr. E. C. Kirk.

THE American National Committee has appointed Messrs. Thos. Cook & Son official Travel and Hotel Agents for the United States —this firm is acting in the same capacity in Europe—see page 908. Members are invited to make use of the facilities offered by Thos. Cook & Son. Arrangements can be made for membership in the special tours for whole or part, or independent steamer and rail transportation by any route desired, with hotel accommodations. Mail may be addressed in care of any of their offices and will be held pending receipt of instructions regarding disposal. At these offices will be found a staff of trained assistants for the purpose of assisting travelers with information and advice.

THE SECTIONS.

Section I: Dental Anatomy, Histology, and Physiology.

SUBJECTS FOR REPORT.

(1) *Evolution of the Human Dentition.* Reporter: Mr. John Humphreys (Birmingham). Speakers: Dr. I. N. Broomell, Philadelphia). Professor Dr. Adloff (Greifswald).

(2) *Calcification.* Reporter: Hofrat Pro-

fessor Dr. O. Walkhoff (Münich). Speakers: Mr. J. Howard Mummery (London), Dr. A. R. Starr (New York), Monsieur J. Choquet (Paris), Mr. W. J. Law (Sheffield).

(3) *Chemistry and Physiology of Saliva.* Reporter: Dr. Edward C. Kirk (Philadelphia). Speakers: Dr. J. N. Langley (University Professor of Physiology, Cambridge), Hofrat Professor Dr. Michel (Würzberg), Professor H. P. Pickerill (Otago), Dr. J. Sim Wallace and Dr. C. Lovatt Evans (London).

PAPERS.

Mons. J. Choquet (Paris), "L'Asymétrie du Maxillaire inférieur: les Conséquences qui en découlent pour la Théorie du Triangle équilatéral de Bonwill."

Dr. H. C. F. Boedecker (Berlin), "The Dentinal Tubules and Fibers."

Dr. Michel (Würzburg), "The Ferment Action of Saliva in Relation to Dental Caries."

Dr. Lovatt Evans (London), "The Amylolytic Power of Saliva."

Dr. C. H. Roberts (New York), "Some Observations on the Teeth of the American Negro."

Mr. D. M. Shaw (to be presented by an officer of the section), "The Bearing of a Theory of Maximum Shear on the Mechanism of Mastication in Man."

Mr. A. W. Wellings (Birmingham), "Intravitam Staining in Dental Histology."

Dr. Brooke Nicholls (Melbourne), "The Teeth of Maoris."

Communications have also been promised by Dr. Arthur Smith Woodward, F.R.S.; Professor Arthur Keith, F.R.S.; Mr. C. W. Andrews F.R.S.; Mr. Pycraft (British Museum).

Section II: Dental Pathology and Bacteriology.

SUBJECTS FOR REPORT.

(1) *Etiology of Dental Caries.* Reporters: Professor H. P. Pickerill (Dunedin, N. Z.), Dr. Fleischmann (Vienna), Professor Cavalié (Bordeaux). Speakers: Dr. von Beust (Dresden), Dr. R. Eckermann (Malmo, Sweden).

(2) *Etiology and Pathology of "Pyorrhea Alveolaris."* Reporters: Dr. E. C. Kirk, (Philadelphia), Dr. Percy R. Howe (Boston).

(3) *Pathology of the Antrum.* Reporters: Dr. M. H. Cryer (Philadelphia), Professor Dr. Landete (Madrid). Speaker: Mr. A. G. G. Plumley (Leeds).

(4) *Pathology of the Pulp.* Reporters: Professor Dr. Römer (Strassburg), Dr. R. W. Bunting (Ann Arbor), Dr. Delplace (Brussels). Speakers: Mr. Stanley P. Mummery and Mr. F. J. Bennett.

(5) *Discussion on the British Dental Association's Odontome Catalog.* Reporters: Messrs. J. Lewin Payne, D. P. Gabell, and W. W. James.

PAPERS.

Dr. Josef Bodo (Olmütz), "Etiologie und Therapie der Alveolar-pyorrhea."

Dr. Julien Zilz (Vienna), "Congenital Syphilitic Variations of Dentin and Enamel."

Dr. J. Mendel (Paris), "Pyorrhea Alveolaris."

Mr. A. Alan Forty (Leeds), "An Extracapsular Odontocele."

Mr. H. E. Bampton (Birmingham): "A Case of Hereditary Dental Pigmentation."

Mr. F. J. Bennett.

Mr. A. Lenhardtson (Stockholm), "The Teeth and the Internal Secretions."

Mr. Ferd. Samuel (Stockholm), "On the Establishment of an International Institute for Research on Dental Caries."

Dr. Henry C. Ferris (New York City), "Pathology as Influenced by the Study of Malocclusion."

Zahnartz Dr. E. Feiler (Breslau), "Eine biologische Caries-theorie" (mit Demonstration mikroskopischer Preparate).

Section III: Dental Surgery and Therapeutics.

SUBJECTS FOR REPORT.

(1) *Oral Sepsis.* (*a*) The general effects upon the system which may be attributed to toxemia of oral origin. Reporter: Sir R. J. Godlee, Bart., President of the Royal College of Surgeons of England. Speaker: Dr. C. N. Johnson (Chicago). (*b*) Prophylaxis in oral sepsis. Reporter: Mr. W. Hern (London). (*c*) The treatment of oral sepsis. Reporter: Dr. M. Roy (Paris). (*d*) The question of fillings, crowns, bridges, and dentures in relation to oral sepsis. Reporter: Professor Dr. Schröder (Berlin).

(2) *Inflammatory Diseases of the Gingival Margin and Periodontal Membrane (Pyorrhea Alveolaris).* (*a*) The clinical signs. Reporter: Zahnarzt H. J. Mamlok (Berlin). (*b*) Local treatment. Reporter: Dr. T. Sydney Smith (Palo Alto, Cal.). (*c*) Treatment by ionic medication. Reporter: Mr.

Ernest Sturridge (London). (*d*) Treatment by vaccines. Reporter: Dr. John Eyre (London). Speaker: Dr. A. C. Valadier (Paris).

Note: It is particularly requested that all papers should be accompanied by photographs, radiograms, etc., demonstrating the progress of cases cited and the results of treatment.

(3) *Restoration of Lost Portions of Tooth Substance by Inlaying.* (*a*) Inlay materials and their manipulation. Reporters: Dr. N. S. Jenkins (Paris) for porcelain; Dr. R. Ottolengui (New York) for gold. (*b*) Principles of cavity preparation. Reporter: Mr. H. W. P. Bennette (Birkenhead). (*c*) The cement lute. Reporter: Mr. J. B. Parfitt (London). (*d*) A comparison of inlays with "fillings." Reporter: Dr. H. F. C. Boedecker (Berlin).

PAPERS.

Dr. M. L. Rhein (New York), "A Scientific Treatment of Pulp, Root-canals, etc.," with radiograph lantern slides.

Dr. E. Burt (Paris).

Dr. Pont.

Dr. Paul Guye (Geneva).

Mr. Sten Hager (Stockholm), "Replantation of Teeth in Severe Cases of Pyorrhea Alveolaris."

Dr. Miègeville (Paris), "A New Form of Devitalizer; Arsenical Cellulose."

Mr. C. Every Brown (Dundee), "The Painless Preparation of Carious Cavities."

Monsieur Francis Jean (Paris), "Procédé pour faciliter l'extraction des dents de sagesse inférieures en direction horizontale."

Monsieur Henri Gresset (Paris), "Traitement des 4 degrés et de leurs complications par l'enfumage iode et présentation de l'appareil."

Dr. V. Guerini (Naples), "An Ideal Cement for Stopping Root-canals."

Section IV: Dental Physics, Chemistry, Radiography, and Metallurgy.

SUBJECTS FOR REPORT.

(1) *Uses and Advantages of X-rays as an Aid to Diagnosis,* including the Differentiation of the Radiographic Appearances of Normal and Abnormal Tissue. Reporters: Dr. H. R. Raper (Indianapolis), Mr. C. A. Clark (London), Professor Dr. W. Dieck (Berlin).

(2) *The Theory of Pressure Casting.* This report will be taken at a conjoint meeting with Section V. Reporters: Mr. L. M. Markham (Newcastle-on-Tyne) and Dr. W. A. Price (Cleveland). Speaker: Zahnarzt O. Riechelmann (Strassburg).

(3) *Structural and Other Changes arising in connection with Metals used in the Mouth.* Reporters: Mr. W. Bruce Hepburn and Tandl. G. Hedstrom (Stockholm). Speaker: Mr. R. Lindsay (Edinburgh).

(4) *Chemical Constitution and Physico-chemical Properties of Dental Amalgams.* Reporters: Professor J. W. McBain and Mr. W. A. Knight (Bristol University).

PAPERS.

Mr. C. A. Achner (London), "X-ray Observations on Abscesses, Cysts, and Root Resection."

Dr. J. Hall-Edwards (Birmingham), "Radiography as applied to Dental Operations."

Dr. T. M. Lowry (London), "The Hand-working and Annealing of Metals and Alloys" (with demonstration).

Dr. I. Robinson (Röntgen Institut, Vienna).

Dr. J. P. Buckley (Chicago), "Chemistry or Therapeutics."

Dr. Stephen Palmer (Poughkeepsie, N. Y.), "Radiography and the General Dental Practitioner" (illustrated).

Zahnarzt O. Riechelmann (Strassburg), "The Physical Laws of the Pressure and Relaxation of Bridge Work."

Monsieur Chameau (Paris), "Studies on Cements."

Section V: Dental Prosthesis.

SUBJECTS FOR REPORT.

(1) *Articulation and Articulators.* Reporter: Dr. J. H. Prothero (Chicago). Speakers: Dr. A. Gysi (Zürich), Dr. Rumpel (Berlin), M. Nasy (Brussels), Dr. Amoëdo and Mons. Ruppe (Paris), Mr. J. Morton (Penrith).

(2) *The Practice of Pressure Casting* (conjointly with Section IV). Reporter: Professor C. Bruhn (Düsseldorf). Speakers: Professor Dr. W. Sachs (Berlin), Dr. A. Bardet (Geneva), Dr. Müller (Zurich), Mr. H. J. Morris, Mons. Charlier (Brussels), Mr. W. W. James (London).

(3) *The Design and Retention of Partial Dentures.* Reporter: Mr. D. P. Gabell (London). Speakers: Mr. H. Watson Turner (London), Mr. A. E. Donagan (Birmingham), Mr. H. Baldwin (London), Mr. G. G. Campion

(Manchester), Dr. R. Weiser (Vienna), Dr. Frank (Amsterdam), Professor Pickerill and Dr. G. Villain (Paris).

President's Address.

"The Problem of Retention in Edentulous Cases."

Papers.

Mr. D. P. Gabell, "Porcelain Work."

Zahnarzt Riechelmann (Strassburg), and Dr. Angel (Copenhagen), "Bridge Work."

Docent Bloch (Copenhagen), "Movements of the Lower Jaw in Relation to Dental Prosthesis."

Mr. A. L. Bostock (Kidderminster), "Design and Retention of Partial Dentures."

Mr. Edwin Houghton (Manchester), "Sectional Bridge Work."

Dr. Julius Barra (Arad), "Platinum in Dental Technique."

Monsieur L. Ruppe (Paris), "Intra-buccal Articulators."

Dr. G. Villain (Paris), "Esthétique faciale"; "Etude dynamique de la dent à pivot"; "Principes et Lois du Mécanisme dentaire humain, leurs conséquences au point de vue prothétique."

Dr. B. Frank (Amsterdam), "Principles and Practice of Arranging Artificial Dentures without the Use of Articulators."

Mr. H. J. Morris, "Areas of Stress in Natural and Artificial Dentures."

Section VI: Orthodontics.

Subjects for Report.

(1) *Unification of Terminology and Classification.* Reporter: Dr. G. Villain (Paris). Speakers: Dr. Lischer (St. Louis), Dr. Godon (Paris), and Zahnarzt E. Herbst (Bremen).

(2) *The Problem of Retention with a view to Permanence of Result and Minimum of Danger.* Reporter: Mr. G. Northcroft. Speakers: Hofrat Professor Pfaff (Leipzig), Mons. F. Jean (Paris), Zahnarzt A. Körbitz (Berlin).

(3) *Nasal Obstruction in relation to Orthodontics.* (*a*) Effects of the Secretions of the Ductless Glands. Reporter: Professor Arthur Keith. Speakers: Professor Leonard Hill and Dr. Lambert Lack. (*b*) Effect of the Expansion of the Dental Arches, with or without the Opening of the Sutures. Reporter: Dr. M. N. Federspiel (Milwaukee). Speakers: Dr. F. L. Stanton (New York) and Zahnarzt Schröder-Benseler.

(4) *Root Movement.* Reporter: Dr. A. Oppenheim (Vienna). Speakers: Dr. C. S. Case (Chicago), Monsieur Alph. Rubbrecht (Brussels), Dr. Hans Hecht (Berlin), and Dr. H. K. Hatfield (Boston).

(5) *Relative Advantages of Fixed and Movable Appliances.* Reporters: Dr. H. A. Pullen (Buffalo) and Dr. V. H. Jackson (New York).

Papers.

Dr. P. J. J. Coebergh (Utrecht), "The Value of Measurements for Diagnosis in Orthodontics."

Zahnarzt Schröder-Benseler, "The Anatomical Principles of the Orthopathy of the Jaws, concluding by Own Investigations."

Dr. L. Subirana (Madrid), "Necessity of the Knowledge of what Is and Signifies the Normal Dental Occlusion."

Monsieur F. Jean (Paris), (1) "Conversion partielle des Molaires en Orthodontie"; (2) "Les Dents Temporaires et les Classifications des Anomalies Maxillo-dentaires."

Dr. G. Villain, "Principes et Lois du Mécanisme dentaire humain; leurs conséquences au point de vue orthopédique."

MM. G. and H. Villain, "Quelques cas d'orthopédie dentaire avec projections."

Dr. V. Guerini (Naples), "A New System for the Correction of Prognathism and Antiversion of the Teeth Without Head-gear or any Other Exterior Apparatus."

Mr. W. Rushton, "A Criticism of the New School of Orthodontics."

Dr. L. Frey.

Dr. F. Vincent Denne, "A Method of Regulating Teeth by means of Spiral Springs."

Mr. Hedley C. Visick.

Monsieur L. Ruppe (Paris), "The Gnathometer."

Section VII: Oral Surgery and Surgical Prosthesis.

Subjects for Report.

(1) *Surgical Prosthesis of the Jaws.* Reporters: Professor Dr. Schröder and Mr. H. Watson Turner. Speakers: Dr. Amoëdo (Paris), Dr. Chiavaro (Rome), Dr. Landete (Madrid), Dr. Harold De Witt Cross (Forsyth Institute, Boston).

(2) *Late Results of Cleft-palate Operations.* Reporters: Dr. T. W. Brophy (Chicago), Mr. H. Blakeway, M.S., F.R.C.S. (London), and Dr. Blair (St. Louis). Speakers: Professor Pickerill, Mr. J. Lewin Payne, Dr. Landete, Dr. Fillebrown (Boston).

(3) *Treatment of Dental and Dentigerous Cysts.* Reporters: Dr. R. Weiser (Vienna), Dr. Widman (Stockholm), Mr. J. H. Gibbs (Edinburgh). Speakers: Dr. M. H. Cryer, Dr. Chiavaro, Mr. E. B. Dowsett (London), Dr. M. Roy (Paris), Dr. M. C. Smith (Lynn, Mass.).

PAPERS.

Dr. Calvin S. Case (Chicago), "The Velum Obturator for Correcting Cleft of the Palate."

Dr. M. H. Cryer, "Clinical Observations on Regeneration of the Mandibular Bone after Caries and Necrosis."

Mr. F. St. J. Steadman (London), "Dental Sepsis as a Predisposing Cause of Cancer."

Dr. A. W. W. Baker (Dublin), "Myeloid Sarcoma of the Jaws."

Dr. A. Oscar Strauss (Milwaukee), "Predisposing Causes of Congenital Cleft-palate and Hare-lip."

Dr. Landete (Madrid), (1) "Surgery of the Maxilla and Consecutive Treatment by the Iodic Filling"; (2) "Case of Ligneous Abscess in the Neck of Dental Origin, Cured by the Anti-staphylococcic Vaccine."

Dr. L. Ottofy (Manila), "Dental and Facial Prosthesis."

Mr. E. D. Davis (London), "The Pathology and Treatment of Suppuration of the Maxillary Antrum."

Dr. Amoëdo and Dr. Delair (Paris).

Professor Pickerill.

Zahnarzt Nauenberg (Leipzig), "Results of Modern Therapeutics in Surgical Prosthesis," illustrated by slides from the Dental Institute of the University of Leipzig.

Zahnarzt Alfred Cohn (Berlin), "Contributions on Re- and Implantation with consequent Mechanical Fixation of the Treated Teeth."

Dr. M. C. Smith (Lynn), "Some Unusual Cases of Fractured Roots."

Section VIII: Anesthesia (General and Local).

SUBJECTS FOR REPORT.

(1) *Nitrous Oxid, Oxygen alone, in mixture, and in sequence for the Extraction Operation.* Reporter: Mr. W. Guy. Speaker: Dr. Dudley Buxton.

(2) *Gas and Oxygen Analgesia for Conservative Operations.* Reporter: Dr. T. B. Hartzell (Minneapolis). Speaker: Dr. A. Blatter (Paris).

(3) *Local Anesthesia* with special reference to (*a*) Methods; (*b*) Drugs; (*c*) Sphere of Usefulness: (*d*) Contra-indications and Dangers. Reporters: Professor Dr. G. Fischer (Marburg), Dr. J. W. Pare and Dr. Eugene R. Warner (Denver). Speakers: Mons. L. Quintin (Brussels), and Dr. A. van Stratum (Liège).

PAPERS.

Dr. J. Stuart Ross (Edinburgh), "What Measures should be taken to Prevent the Occurrence of Anesthetic Accidents?"

Dr. R. H. Riethmüller (Philadelphia), "Improvements in Local Anesthesia by Novocain-suprarenin."

Dr. W. A. Hunt (Yeovil), "Anesthetics and Dentists, and the very earliest Cases of Ether Administration in This Country."

Mr. J. H. Gibbs.

Mons. Franchette (Paris), "Présentation d'un Anesthésiographe."

Dr. Miègeville (Paris), "La Sérocaïne, serum anæsthétique intensif pour insensibilisation locale et régionale en art dentaire."

Mr. F. St. J. Steadman, "Analgesia."

Mr. A. H. Parrott (Birmingham), "Injection (Intra-alveolar) Anesthesia in Conservative Work."

Section IX: Oral Hygiene, Public Instruction, and Public Dental Services.

SUBJECTS FOR REPORT.

(1) *Effects of Dental Treatment on National Health and Physique.* It is intended that this discussion shall deal with the advantages of public dental treatment in (*a*) schools, reformatories, etc.; (*b*) the services; (*c*) institutions for adults under insurance systems. Reporters: Professor Dr. Jessen, Dr. H. L. Wheeler, Dr. R. Lemière (Paris), Mr. W. Harrison, Mr. R. Denison Pedley (president of the School Dentists' Society), and Mr. William Fisk (hon. secretary of the School Dentists' Society).

(2) *Prophylactic Treatment at Different Ages.* It is intended that this discussion shall deal with all measures calculated to reduce the incidence of dental disease at different periods of life. Reporters: Mr. R. D. Pedley and Dr. J. Sim Wallace (London), Dr. A. R. Melendy (Knoxville), Dr. W. H. Potter (Boston), Dr. Siffre, and Mr. A. Lenhardtson (Stockholm).

(3) *Lantern Demonstrations of Slides*

showing: (*a*) Means of affording Public Instruction in Dental Hygiene, *e.g.*, Lecture Materials, Charts, etc.; (*b*) Photographs of School Dental Clinics, Institutions for Public Dental Service for Adults, or other Institutions in which Public Dental Treatment is being carried out.

To be contributed to by all countries willing to send representatives. It is intended that a large number of dentists having slides of the institutions with which they are connected, or having slides pertaining to public instruction, should exhibit these and very briefly describe them.

PAPERS AND LANTERN DEMONSTRATIONS.

Dr. K. Cohn (Berlin), "Proposals regarding the Method of Statistical Examination of School Children."

Dr. W. A. White (Phelps, N. Y.), "Means of Public Instruction in Dental Hygiene, as conducted by the New York Department of Health."

Mr. F. Byrne, "Army Dental Scheme in Detail for the Home Services."

Mons. Francis Jean (Paris), "Dental Hygiene and the Public."

Mr. E. E. Fletcher (Devonport), "Dentistry in the Navy."

Tandl. Hugo Hammarlund (Stockholm), "Comparative Statistical Examinations of Decay of Teeth at the Ages of Seven and Eight."

Dr. F. Kehr (Director of Municipal School Dental Clinic, Düsseldorf), "Organization of School Dental Treatment Centers in Düsseldorf and in Urban and Rural Districts of Germany."

Surgeon-Major Loos (Strassburg) and Mr. R. M. Wormald (Brighton), "Army Dental Treatment."

School Inspector Motz (Strassburg), "School Dental Clinics from the Standpoint of the Educationist."

Dr. A. Piperno (Director of Municipal School Dental Clinic, Rome), "Epidemiology of Dental Diseases."

Hofrat Dr. Röse (Erfurt), "Prophylaxis of Dental Disease by means of Suitable Diet."

Dr. O. Smith Housken (Christiania), "Public Dental Hygiene in Norway."

Mr. C. E. Wallis (Dental Surgeon to King's College Hospital), "Dental Inspection and Treatment in London County Council Schools."

Dr. G. Wolf (Vienna), "The Present Position of School Dentistry in Austria," and "Process of Examination of School Children."

Monsieur F. Fabret (Nice).

The Director-General of the Navy Medical Service is lending a comprehensive exhibit to the Museum for this section.

The Lantern Demonstrations, notified up to the present, include—

School Clinics: Messrs. C. E. Wallis, G. Thomson, Grantley Smith, W. W. Gabell, W. Fisk, and A. Dinnis.

Hygiene Lectures: Messrs. C. E. Wallis, R. D. Pedley, and G. Thomson.

Public Dental Services: Messrs. W. Harrison (Brighton), C. N. Peacock (Bedford), A. M. Kempe (Bournemouth), A. Naismith (Glasgow), E. E. Heesom (Redhill), W. B. Bacon (Tunbridge Wells), and V. Knowles (Reading).

Industrial Clinics: Mr. F. J. Blight (Liverpool) and Mr. C. H. Russell Grant (London).

Discussion on "Uniform Treatment in School Dental Clinics in All Countries." Propositions by Professor Dr. Jessen.

Section X: Dental Education.

SUBJECTS FOR REPORT.

(1) *The Teaching of Bacteriology for Dental Students,* with special reference to the Method and the Extent of the Teaching. Reporter: Mr. J. Howard Mummery.

(2) *A Practical Synopsis of Medical and Surgical Teaching for Dental Students.* Reporters: Dr. Godon (Paris) and Dr. Douglas-Crawford (Liverpool).

(3) *The Essential Principles of Practical Teaching.* Reporter: Mr. T Gaddes.

(4) *Methods of Teaching Orthodontics to Dental Students.* Reporters: Dr. S. H. Guilford (Philadelphia), Mons. Paul Martinier and Dr. G. Villain (Paris).

PAPERS.

Dr. Eudore Dubeau (Montreal), "Methods of Manual Training."

Dr. A. E. Webster (Toronto), "Dental Education."

Dr. E. Rosenthal (Brussels), "Deontology" (Ethics).

Dr. Subirana (Madrid), "The Teaching of Dentistry and Orthodontics."

Dr. Grevers (Utrecht), "Method of Teaching the Diagnosis of Diseases of the Dental Pulp."

International Congress Museum.

SECTIONS OF THE MUSEUM.

(1) Dental Anatomy, Histology, and Physiology.

(2) Dental Pathology and Bacteriology.

(3) Dental Surgery and Therapeutics.

(4) Dental Physics, Chemistry, Radiography and Metallurgy.

(5) Dental Prosthesis.

(6) Orthodontics.

(7) Oral Surgery and Surgical Prosthesis.

(8) Anesthesia.

(9) Oral Hygiene, Public Instruction and Public Dental Services.

(10) Dental Education.

All exhibits must be received, properly packed, registered, and carriage paid, at the University of London, South Kensington, London, S. W., on or after Monday, July 13, and before July 20, 1914.

Demonstrations.

The following Demonstrations have already been notified to the General Secretaries:

"Surgical Treatment of the Root Surfaces and Alveolar Process in Pyorrhea Alveolaris," by Dr. Thos. B. Hartzell, Minneapolis.

"Orthodontic Demonstration, with Models and Appliances," by Dr. Victor Hugo Jackson, New York.

"Electricity," By Dr. L. E. Custer, Dayton.

"Pyorrhea and Prophylaxis," by Dr. Louis Meisburger, Buffalo.

"Carving of Natural Formed Teeth in Plaster" and "Correct Mechanical Articulation by Medium of the Condyleometer and Anatomical Articulator," by Dr. W. W. Evans, Washington.

"Porcelain Jacket Bicuspid," by Dr. W. A. Capon, Philadelphia.

"Instruction of Patients in Mouth Hygiene" and "Instrumentation at Bifurcations between Roots in the Treatment of Pyorrhea Alveolaris," by Dr. Jules J. Sarrazin, New Orleans.

"A New Apparatus for Reaming Parallel Canals for Posts and the Use of the same in making Stationary and Removable Bridges," by F. Thue, Christiania.

"The Step System in Preparation of Roots for Crowns and Bridges" (Dr. E. G. Christiansen's method); "The Jackson Clasp for One-sided Prosthesis in the Lower Jaw"; "The Christiansen's Clasp"; and "Dr. E. G. Christiansen's Method for Renewing Old Vulcanite Plates," by G. Thorsen, Demonstrator at the Norwegian State Dental School, Christiania.

"The Wire Separator and its Use in Separating Teeth," by E. Kaasen, D.D.S., Christiania.

Demonstrations of the Electro-magnet, a Sterilized Saliva Ejector for using once, and an Electric "Chauffe-gutta" for Sealing Bridges, by Mons. H. Villain, Paris.

"Mesure du Rendement des Instruments rotatifs en Dentisterie opératoire," by Dr. E. Huet, Brussels.

"Practical Demonstration on the Use of the Elevator," by Monsieur Franchette, Paris.

"Accurate Model Making," by Dr. P. J. J. Coebergh, Utrecht.

"Immediate and Deeper Results with Silver Nitrate by means of a Reducing Solution," by Dr. W. T. Shanasy, Adelaide, South Australia.

"Plastic Filling," by Mr. C. M. Cunningham, Belfast.

"Analgesia," by Mr. H. C. Visick, London.

"Anesthesia of the Pulp by Intra-Dentinal Injection," by Mr. Wilton Thew, London.

"Regional Anesthesia," by Mr. W. A. Clements, Manchester.

"Cleft-palate and Bridge Work," by Mr. Edwin Houghton, Manchester.

"Impressions and Impression Materials, and Examples of Porcelain Work," by Mr. W. Simms, Manchester.

"Skull Cap, etc., used for Orthodontic Work," by Mr. H. W. Norman, Manchester.

A further list of British demonstrations is in course of preparation.

Notices.

Closing meeting will be on Saturday, August 8th, at 12 noon.

A *daily program* will be issued with the *Daily Journal* during the period of the Congress.

Exhibition of Dental Appliances, etc. This will be found in the Great Hall, and the East and West Galleries of the University.

ENTERTAINMENTS ALREADY ARRANGED.

Informal Reception at the Hotel Cecil. Monday, August 3d.

Reception by the Lord Mayor and Corporation of London at the Guildhall. Tuesday, August 4th.

Reception by the President and Council at the Royal College of Surgeons. Wednesday, August 5th.

Reception by the British Dental Association at the Natural History Museum, South Kensington. Friday, August 7th.

The Congress Banquet.

The Banquet of the Congress will take place in the Imperial Banqueting Hall at the Anglo-American Exhibition (White City) on Thursday, August 6th, and the price of tickets will be 7s. 6d., including admission.

Early application for tickets should be made to the General Secretaries of the Congress, 19 Hanover Square, London, W.

During the period of the Congress refreshments may be obtained and luncheons will be provided in a special marquee to be erected in the quadrangle of the University.

Excursions.

Arrangements are being made for conducting parties of members to the various places of historic interest in London and the vicinity, and to different hospitals and scientific institutions. A concise guide to London will accompany the final program.

After the conclusion of the Congress, members will have opportunities of visiting places farther afield, such as Oxford, Cambridge, Shakespeare's country, the Lakes, Isle of Wight, Scotland, etc., and when the number desiring to take advantage of doing so is known, all possible facilities will be afforded to them.

A Ladies' Committee has been appointed to provide special entertainment for ladies accompanying members at such times as the more technical part of the work of the Congress is in progress.

Travel and Hotels.

Arrangements for reaching London from various parts of the world by different routes, and hotel arrangements during the period of the Congress, are in the hands of Messrs. T. Cook and Son, Ludgate Circus, E. C.

HOTEL ACCOMMODATION.

For the purpose of assisting delegates attending the Congress, Messrs. Thos. Cook and Son have undertaken to reserve any hotel accommodation which may be required. Members wishing to avail themselves of these facilities should send a deposit of £1 (or $5.00; frs. 25.00; lire 25.00; mks. 20.25; kr. 24.00) to Thos. Cook and Son, Ludgate Circus, London, or to any of their offices, when the desired rooms will be reserved. A receipt will be issued for the amount in question, and this will be accepted in part payment of the hotel bill.

AMERICAN MILLER MEMORIAL.

TO THE DENTAL PROFESSION OF AMERICA:

The committee appointed by the Ohio State Dental Society at the 1909 meeting for the purpose of raising funds for an American Memorial to the late Dr. W. D. Miller desire to make the following report:

Funds have been received from the following states: Alabama $25.00, Arizona $25.00, Arkansas $50.00, California $60.00, Colorado $82.00, Connecticut $50.00, Georgia $60.00, Illinois $531.00, Iowa $200.00, Indiana $75.00, Kansas $134.50, Kentucky $105.00, Maine $25.00, Massachusetts $100.00, Michigan $300.00, Minnesota $100.00, Missouri $100.00, Montana $15.00, Nebraska $100.00, New Hampshire $25.00, New Mexico $25.00, New York $125.00, Ohio $1303.00, South Carolina $25.00, North Dakota $50.00, South Dakota $15.00, Oklahoma $31.00, Oregon $50.00, Pennsylvania $20.00, Tennessee $50.00, West Virginia $25.00, Washington $50.00, Wisconsin $25.00, Wyoming $10.00, Texas $50.00, Utah $14.00, Vermont $20.00, Virginia $50.00. Total $4300.50; interest on this fund to December 1, 1913, amounts to $382.94, making a total in the hands of the treasurer, Dr. Weston A. Price, of $4683.44. Florida and Mississippi have each voted $50.00, but the amounts are not in the treasurer's hands at this date.

* * * * *

It is hoped that sufficient funds—$5500.00—will be in the treasury that steps can be taken at once toward the construction of this memorial, so that it may be finished and ready for unveiling at the 1915 meeting, which will be the fiftieth anniversary, of the Ohio State Society.

* * * * *

Yours very truly,
EDWARD C. MILLS, *Chairman,*
J. R. CALLAHAN,
S. D. RUGGLES,
Committee.

COLUMBUS, OHIO, April 7, 1914.

Panama-Pacific Dental Congress.

San Francisco, Cal., August 30 to September 9, 1915.

THE following explanation of the meaning of the seal is given by Dr. Herbert J. Samuels, of Oakland, Cal., its designer: The female figure, representing Minerva, the Roman goddess of wisdom, and more especially the knowledge of the arts and sciences, scientific and practical truth, surmounts the universe, and, standing on a bank of clouds, offers on one hand the light of learning, typified by the torch, and on the other the reward of achievement and honor, symbolized by the laurel. The two spheres represent the name of the congress and the place of meeting. On the right of the figure is the Western hemisphere with the two oceans which have been made one by the Panama Canal, and on the left is the "Golden Gate," the Bay of San Francisco, and the wonderful city on its shores. The fruits and flowers furnish a pleasing setting for the year, "1915," and signify that the country in which the congress will be held abounds in fruitful opportunities and blessings.

OPENS AUG. 30TH, 1915

THE SEAL.

MORE than 3000 dentists from every part of the civilized world now are expected to attend the Panama-Pacific Dental Congress to be held in San Francisco during the Panama-Pacific International Exposition, which will be open from February 20 to December 4, 1915, inclusive.

The Dental Congress will convene August 30, 1915, and will remain in session for ten days. Dentists of international reputation will attend, and the discussions of the thousands of delegates will mark an epoch in the history of dentistry. It will be a thoroughly international gathering. Papers will be read on the most advanced subjects known to the profession. The latest methods used by dentists in various countries will be demonstrated in a great clinic, where there will be from twenty-five to fifty chairs, and all kinds of dental operations will be performed for the benefit of the thousands of assembled dentists.

The Committee of Organization of the Panama-Pacific Dental Congress is pleased to report to the members of the dental profession the progress of its work, feeling that a sound foundation has now been laid for the greatest dental meeting ever attempted. Letters received from every state and country in the world indicate a widespread and lively interest in the congress and give promise of a record-breaking attendance. At the present time, sixteen months before the opening of the congress, over one-third of the space for exhibits has been reserved, many applications are pending, and without doubt the whole twenty-two hundred front feet of exhibit space will soon be taken. Contributions to the program are being received and the success of the meeting is assured. The Panama-Pacific International Exposition, as far as its buildings and grounds are concerned, is rapidly assuming a finished appearance. The eleven great exhibit palaces will be ready for occupancy on or before the first day of next July, two being ready for exhibits at the present time. The machinery building, now finished, measures one and one-third miles around the cornice and contains over nine million feet of lumber. The Exposition will be READY ON TIME, and everyone should plan to see what for many years to come will be the last word in great educational and industrial expositions.

A number of national and state dental societies and fraternities will meet with the Panama-Pacific Dental Congress, instead of holding their individual annual meetings. Among those that already have signified their intention of meeting with the congress are the National Dental Association and the American Society of Orthodontists.

The Dental Congress will be held during the pleasantest season of the year, when the Exposition will be at the height of its activity, and no member of the dental profession who possibly can come to San Francisco can afford to miss this great occasion.

Committee of Organization.

Frank L. Platt, *chairman*, 323 Geary st., San Francisco.
Arthur W. Chance, *vice-chairman*, Corbett Bldg., Portland, Ore.
Arthur M. Flood, *sec'y*, 240 Stockton st., San Francisco.
F. G. Baird, Butler Bldg., San Francisco.
H. A. Fredrick, 2152 Sutter st., San Francisco.
Jos. Loran Pease, Central Bank Bldg., Oakland, Cal.
H. G. Chappel, Oakland Bank of Savings Bldg., Oakland, Cal.
F. C. Jarvis, First National Bank Bldg., Oakland, Cal.
T. Sydney Smith, Palo Alto, Cal.
R. B. Giffen, Hagelstein, Bldg., Sacramento, Cal.
Chas. M. Benbrook, Auditorium Bldg., Los Angeles, Cal.
Geo. T. Williams, Cobb Bldg., Seattle, Wash.
Geo. F. Stiehl, Salt Lake City, Utah.
B. M. Brookfield, Idaho Falls, Idaho.
H. H. Wilson, Phœnix, Arizona.

Officers of Sections.

SECTION I.—*Anatomy, Physiology and Histology.*

I. Norman Broomell, *ch.*, Medico-Chirurgical College, Seventeenth and Cherry sts., Philadelphia, Pa.
W. H. G. Logan, *vice-ch.*, 29 East Madison st., Chicago, Ill.
Malcolm Goddard, *sec'y*, Butler Bldg., San Francisco, Cal.

SECTION II.—*Etiology, Radiography, Pathology, and Bacteriology.*

Fredk. B. Noyes, *ch.*, 122 South Michigan ave., Chicago, Ill.
R. H. Hofheinz, *vice-ch.*, 818 Ch. of Com. Bldg., Rochester, N. Y.
W. H. Renwick, *sec'y*, Sacramento, Cal.

SECTION III.—*Chemistry and Metallurgy.*

M. L. Ward, *ch.*, Ann Arbor, Mich.
Henry H. Boom, *vice-ch.*, Philadelphia Dental College, Eighteenth and Buttonwood sts., Philadelphia.
H. A. Tuckey, *sec'y*, Head Bldg., San Francisco.

SECTION IV.—*Oral Hygiene and Prophylaxis.*

Herbert L. Wheeler, *ch.*, 560 Fifth ave., New York City, N. Y.
W. W. Belcher, *vice-ch.*, 122 Clinton ave., South Rochester, N. Y.
Robert W. Hall, *sec'y*, Salt Lake City, Utah.

SECTION V.—*Materia Medica and Therapeutics.*

J. P. Buckley, *ch.*, 39 South State st., Chicago, Ill.
Carl D. Lucas, *vice-ch.*, 704 Hume-Mansur Bldg., Indianapolis, Ind.
Frank C. Pearn, *sec'y*, North Pacific College of Dentistry, Portland, Ore.

SECTION VI.—*Oral Surgery.*

Truman W. Brophy, *ch.*, 81 East Madison st., Chicago, Ill.
Adolph Bernhart Baer, *vice-ch.*, 177 Post st., San Francisco, Cal.
E. S. Barnes, *sec'y*, Cobb Bldg., Seattle, Wash.

SECTION VII.—*Orthodontia.*

J. Lowe Young, *ch.*, 576 Fifth ave., New York, N. Y.
Robert Dunn, *vice-ch.*, Head Bldg., San Francisco, Cal.
Jas. David McCoy, *sec'y*, Brockham Bldg., Los Angeles, Cal.

SECTION VIII.—*Operative Dentistry.*

John Sayre Marshall, *ch.*, 2912 Pine ave., Berkeley, Cal.
H. E. Friesell, *vice-ch.*, Highland Bldg., Pittsburgh, Pa.
E. A. Tripp, *sec'y*, Salt Lake City, Utah.

SECTION IX.—*Prosthesis.*

Ellison Hillyer, *ch.*, 1143 Dean st., Brooklyn, N. Y.
F. W. Hergert, *vice-ch.*, Cobb Bldg., Seattle, Wash.
C. O. Edwards, *sec'y*, 3989 Howe st., Oakland, Cal.

SECTION X.—*Education, Nomenclature, Literature, History, Legislation.*

C. N. Johnson, *ch.*, 22 East Washington st., Chicago, Ill.
Homer C. Brown, *vice-ch.*, 185 East State st., Columbus, Ohio.
Henry C. Fixott, *sec'y*, Portland, Ore.

Rules Governing Officers of Sections, and State and National Executive Committees.

Rule 1. The officers of each section shall constitute the board of censors for that section.

Rule 2. The officers of each section shall co-operate with state and national Executive Committees in securing papers and clinics for the program of the congress, and also with the Program and Clinic Committees.

Rule 3. The officers of each section and the chairmen and members of state and na-

tional Executive Committees are empowered to solicit and receive from legal and reputable practitioners of dentistry and medicine, and persons proficient in the allied sciences, papers and clinics on subjects of interest to the congress, it being understood that each essayist or clinician is an authority on, or particularly well qualified to deal with, the subject presented.

Rule 4. The chairman of each section is invited to deliver an address before his section, not to exceed twenty minutes in length; this address to constitute one of the papers of that section.

Rule 5. The aggregate number of papers accepted shall not exceed ten for each section, and not more than two-fifths of those accepted may be read by title.

Rule 6. Papers may be read and discussed before the congress in any language, but copies of all papers, or summaries of papers, and discussions, typewritten in the English language, ready for printing, must reach the Program Committee in San Francisco not later than May 1, 1915.

Rule 7. Each paper and discussion will be printed in full in the published Transactions of the congress, but a maximum of twenty minutes only will be allowed for the reading of a paper, or a summary embracing its leading points in case the reading of the original would occupy more than the allotted time, and five minutes for each speaker taking part in the discussion; not more than fifteen minutes will be allowed for the discussion of any paper, and the author will be allowed five minutes in closing the discussion.

The author of each paper is requested to furnish the secretary of the section to which his paper belongs with the names and addresses of those who will discuss his paper.

Rule 8. No clinic will be given a place on the program of the congress unless a concise description of it, typewritten in the English language, ready for printing, reaches the Clinic Committee in San Francisco on or before May 1, 1915.

Rule 9. State and national Executive Committees are governed by the rules governing the officers of sections, so far as they apply. Note particularly Rules 2, 3, 5, 6, 7, and 8; also

Rule 10. Each contribution to the program, either paper or clinic, shall be sent promptly to the chairman of the section in which its title indicates it to belong. In case of doubt, it shall be sent to the office of the Committee of Organization in San Francisco, this committee determining its place on the program.

Rule 11. In the event of any controversy arising between contributors and the officers of any section, the question at issue shall, at the discretion of the officers of the section, be submitted to the Committee of Organization for final adjustment.

Qualifications for Membership.

State and national Executive Committees are empowered to receive applications for membership from none but legal and reputable practitioners of dentistry, who are personally known to be such, vouched for by an officer of the principal dental society of their locality, or by some other known reputable and legal practitioner. Each application must be signed by a member of a state or national Executive Committee.

The membership fee is $10.00. Visitors to the congress are not eligible for membership. Members may introduce members of their families as visitors to the congress upon payment of a fee of $2.50.

Program Committee. E. E. Evans, *ch.*, Union Savings Bank Bldg., Oakland, Cal. Herbert J. Samuels, Central Bank Bldg., Oakland, Cal. Shirley J. Ashby, 3846 Twenty-fourth st., San Francisco. M. J. Congdon, Eastman Bldg., Berkeley, Cal. C. T. Hansen, 133 Geary st., San Francisco.

Clinic Committee. John D. Millikin, *ch.*, 323 Geary st., San Francisco. Samuel W. Hussey, 2649 Russell st., Berkeley, Cal. E. J. Howard, 323 Geary st., San Francisco. Homer T. Craig, 509 Butler Bldg., San Francisco. H. C. Peters, 323 Geary st., San Francisco.

Entertainment Committee. Frank C. Pague, San Francisco, *ch.;* Paul A. Mariotte, Oakland; A. W. Ward, San Francisco; Edward Otis Whitney, San Francisco; Franklin H. Locke, Oakland.

Transportation Committee. Henry Woods Weirick, *ch.*, San Francisco; Harry R. Evans, New York City; Alpheus R. Brown, Boston, Mass.; E. M. Carson, St. Louis; F. W. Gethro, Chicago, Ill.; J. D. Eby, Atlanta, Ga.

State and National Executive Committees.

Alabama. L. A. Crumley, First Nat'l Bk. Bldg., Birmingham, *ch.;* H. Clay Hassell, George S. Vann, E. W. Patton, A. K. Parks.

Arkansas. O. W. Huff, Dugan-Stuart Bldg., Hot Springs, *ch.;* E. L. Watson, J. E. Andrews, E. W. Smith, I. M. Sternberg.

Arizona. H. H. Wilson, Phœnix, *ch.;* John A. Lentz, J. Harvey Blain, W. P. Sims, W. A. Baker.

Colorado. Henry B. Hayden, Exchange Nat'l Bk. Bldg., Colorado Springs, *ch.;* H. A.

Fynn, B. Frank Gray, Wm. A. Brierley, George Y. Wilson.

Connecticut. James McManus, Hartford, *ch.;* E. S. Gaylord, A. J. Cutting, W. O. Beecher, B. A. Sears.

District of Columbia. M. F. Finley, 1928 I st., N. W., Washington, D. C., *ch.;* J. H. London, Thos. L. Rust, Geo. W. Boynton, H. J. Nichols.

Florida. S. W. Allen, Tampa, *ch.;* W. G. Mason, J. E. Chace, F. E. Buck, W. S. Hall.

Georgia. Frank Holland, 717–718 Grant Bldg., Atlanta, *ch.;* D. D. Atkinson, S. W. Foster, C. M. Barnwell, H. H. Johnson.

Idaho. B. M. Brookfield, Idaho Falls, *ch.;* J. A. Kimball, J. B. Burns, E. L. Youngberg, E. H. Mayberly.

Illinois. Arthur D. Black, 122 South Michigan ave., Chicago, *ch.;* J. H. Prothero, J. P. Buckley, W. F. Whalen, A. E. Converse.

Indiana. Geo. E. Hunt, 131 East Ohio st., Indianapolis, *ch.;* E. R. Kibler, Fred O. Henshaw, D. Carl Lucas, D. A. House.

Iowa. J. V. Conzett, 256 Thirteenth st., Dubuque, *ch.;* W. R. Clack, R. H. Volland, William Finn, G. W. Slingluff.

Kansas. W. H. Fessenden, Ottawa, *ch.;* Frank O. Hetrick, C. E. Burgson, H. W. Hodges, C. B. Osterhout.

Kentucky. McFerran Crow, Lexington, *ch.;* J. H. Baldwin, I. B. Howell, Walter Mathews, Paul W. Prewitt.

Louisiana. C. V. Vignes, Machica Bldg., 830 Canal st., New Orleans, *ch.;* J. J. Sarrazin, Samuel H. McAfee, Frederick Ratzburg, Oscar J. Ory.

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Mississippi. A. B. Kelly, Yazoo City, *ch.;* W. R. Wright, J. F. Brunson, H. D. Chipps, R. K. Luckie.

Missouri. Burton Lee Thorpe, 3605 Lindell Blvd., St. Louis, *ch.;* J. D. Patterson, Chas. Channing Allen, J. P. Marshall, V. R. McCue.

Montana. T. M. Hampton, Helena, *ch.;* T. T. Rider, G. E. Longeway, C. H. Head, G. A. Chevigny.

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New York. S. W. Van Saun, 250 W. Seventy-fourth st., New York City, *ch.;* L. A. Timerman, B. S. Hert, Leuman M. Waugh, W. G. Lewis.

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Oregon. Arthur W. Chance, Corbett Bldg., Portland, *ch.;* J. A. Harper, M. S. Kern, M. C. Holbrook, C. M. Harrison.

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Alaska. T. H. White, Sitka, *ch.*

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Peru. Dr. S. R. Salazar, Apartado 1177, Lima, *ch.;* Dr. Christian Dam, Dr. Herman de Castro, Dr. D. S. de Castro, Dr. Ernesto Febres Odriozola.

San Salvador, Central America. Dr. J. Schneider, San Salvador, Central America via Zacapa, care R. Barrios, *ch.;* Dr. Juan F. Orozco, Dr. D. Norris Richardson, Dr. J. G. Saravia, Dr. Enrique Gonzalez.

South Africa. Wm. D. Quinn, J.P., L.D.S.R.C.S.I., 12 to 17 Stuttaford's Chambers, Pritchard and Rissik sts., Johannesburg, Transvaal, *ch.;* W. Trembuth, L.D.S.R.C.S.E., G. Friel, L.D.S.R.C.S.E., Rupert W. S. Quinn, D.M.D., E. Digby, L.D.S.R.C.S.E.

Sweden. Dr. Elof Förberg, Villa Förberg, Djursholm, *Ch.;* Dr. Stan Hager, Dr. Iwan Lamby, Dr. Gotthard Dahlen, Dr. Hugo Hammarlund.

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New Zealand. Dr. H. P. Pickerill, Dunedin, *ch.;* Messrs. Hunter, Throp, Dodgshun and Barron.

The appointment of other state and national Executive Committees is now pending.

VIRGINIA STATE DENTAL ASSOCIATION.

THE next meeting of the Virginia State Dental Association will be held at Old Point Comfort, Va., July 1, 2, and 3, 1914, inclusive. All ethical dentists are invited to attend.

C. B. GIFFORD, *Sec'y,*
Norfolk, Va.

FLORIDA STATE DENTAL SOCIETY.

THE Florida State Dental Society will hold its annual meeting at Atlantic Beach Hotel, Atlantic Beach, Fla., July 1, 2, and 3, 1914. All ethical dentists cordially invited to attend. Any other information will be gladly furnished by

ALICE P. BUTLER, *Corresponding Sec'y,*
Gainesville, Fla.

NEW JERSEY STATE DENTAL SOCIETY.

THE twin cities by the sea—Ocean Grove and Asbury Park—will again entertain the members and guests of the New Jersey State Dental Society. The forty-fourth annual convention of the society will be held in the North End Hotel, Ocean Grove, N. J., on July 15, 16, 17, and 18, 1914, beginning at 10 A.M. on Wednesday, July 15th.

The North End Hotel is one of the largest and finest on the Jersey coast, and is situated directly on the beach front at the foot of Wesley lake and within a moment's walk of the Asbury Park Casino and trolley. Connected with the hotel by a bridge over the boardwalk is a large pavilion built over the ocean. The second floor of this pavilion will be devoted exclusively to exhibits and clinics.

Dr. Walter F. Barry, 220 Essex ave., Orange, N. J., is chairman of the Exhibit Committee, and has made an ideal arrangement of space for the exhibits. Dr. Barry will be glad to furnish information regarding the rates and space still available.

The clinics will be in charge of Dr. James I. Woolverton, 228 W. State st., Trenton, N. J. Plenty of space will be available, so that crowding will be avoided and everyone will have a chance to see the clinics.

The meetings of the society and the reading of papers will take place in the hotel either in the American dining room or in the picture theater, as will be announced in the program, which will be issued about July 1st.

At the hotel end of the bridge a room will be reserved for the officers of the society as headquarters, and this will be the executive office and bureau of information during the convention.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH, *Sec'y,*
430 E. State st., Trenton, N. J.

TRI-STATE DENTAL ASSOCIATION.

THE first annual meeting of the Tri-State Dental Association [District of Columbia, Maryland, and Virginia] will be held at the Bay Shore Hotel, Buckroe Beach, Va., July 23, 24, and 25, 1914. A program of unusual interest has been prepared, and we extend a cordial invitation to all ethical practitioners of other states.

D. H. FERGUSON, *President,*
J. M. G. RAMSEY, *Sec'y.*

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirty-first annual meeting of the Minnesota State Dental Association will occur in Duluth, Minn., August 6, 7, and 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

BENJAMIN SANDY, *Sec'y,*
Minneapolis, Minn.

WISCONSIN STATE DENTAL SOCIETY.

The Wisconsin State Dental Society will hold its next annual meeting July 14, 15, and 16, 1914, at Fond du Lac, Wis.

O. G. Krause, *Sec'y.*

ILLINOIS STATE DENTAL SOCIETY.

At the annual meeting of the Illinois State Dental Society, the following officers were elected for the ensuing year: J. M. Barcus, Carlinville, president; J. P. Buckley, Chicago, vice-president; Henry L. Whipple, Quincy, secretary; T. P. Donelan, Springfield, treasurer; J. D. Wilson, Danville, librarian.

The fifty-first annual meeting will be held at Peoria, May 11, 12, 13, 14, 1915.

Henry L. Whipple, *Sec'y.*

VERMONT STATE DENTAL SOCIETY.

At the thirty-eighth annual meeting of the Vermont State Dental Society, the following officers were re-elected for the ensuing year: Thomas Mound, Rutland, president; W. H. McGoff, Montpelier, first vice-president; H. M. Smith, Lyndonville, second vice-president; P. M. Williams, Rutland, secretary; W. H. Munsell, Wells River, treasurer. Executive Committee—G. E. Partridge, Burlington, W. R. Pond, Rutland; and David Manson, Burlington.

P. M. Williams, *Sec'y,*
Rutland, Vt.

G. V. BLACK CLUB OF NEWARK, N. J.

Dentists of Newark, N. J., have formed a G. V. Black Dental Club—which starts with a membership of fifteen—for scientific, legislative, and social purposes. Meetings are held semi-monthly. A meeting was held May 26th, on which occasion Dr. L. Biddle Duffield read a paper entitled "Nitrous Oxid and Oxygen in Dental Surgery." Other prominent dentists and physicians are listed on the program for ensuing meetings.

Morris Rosenblum, *Sec'y,*
34 Sixteenth ave., Newark, N. J.

NORTH DAKOTA BOARD OF EXAMINERS.

The next regular meeting of the North Dakota Board of Dental Examiners will be held in Fargo, N. D., July 13, 14, 15, and 16, 1914. All applications for examinations must be in the hands of the secretary by July 3, 1914.

For further information apply to

F. A. Bricker, *Sec'y,*
Fargo, N. D.

SOUTH DAKOTA BOARD OF EXAMINERS.

The next regular semi-annual meeting of the South Dakota Board of Dental Examiners will be held at Sioux Falls, S. D., on Tuesday, July 7, 1914, at 1.30 p.m. Applications for examination must be made before July 1st. For blanks and further particulars apply to

Aris L. Revell, *Sec'y,*
Lead, S. D.

MONTANA BOARD OF EXAMINERS.

The Montana State Board of Dental Examiners will hold their annual meeting in Helena, Mont., July 13 to 17, 1914, inclusive. All applications must be in the hands of the secretary ten days prior to the opening of the meeting. Examination and license fee $50. For other information and examination blanks address

Ralph R. Rathbone, *President,*
Dillon, Mont.
Gilbert A. Chevigny, *Sec'y,*
Clark Bldg., Butte, Mont.

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. Harvey Blain, *Sec'y,*
Prescott, Ariz.

RHODE ISLAND BOARD OF REGISTRATION.

The Rhode Island Board of Registration in Dentistry will meet in the State-house, Providence, July 1, 2, and 3, 1914. For applications and further information apply to

Albert E. Seal, *Sec'y*,
12 East ave., Pawtucket, R. I.

IDAHO BOARD OF EXAMINERS.

The next regular semi-annual meeting of the Idaho Board of Dental Examiners will be held at Boise, Idaho, on Wednesday, July 1, 1914, at 9 A.M., in the State Capitol building. Applications for examination must be made before July 1st. For blanks and further particulars apply to

A. A. Jessup, *Sec'y*,
Boise, Idaho.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending May 16, 1914:

A. T. Knoderer, ACT.D.S., has been relieved from duty in the Philippine Islands, and upon reporting his arrival in the United States his contract will be annulled.

H. C. Peavey, ACT.D.S., on completion of his temporary duty at Fort Constitution, will return to his proper station, Fort Williams, Me.

For the week ending May 23d:

First Lieut. E. P. R. Ryan, resignation accepted, to take effect November 15th:

The following ACT.D.S., recently appointed in the United States Army, have been assigned to the stations after their names: Richard B. Clark, Fort Winfield Scott; Leigh C. Fairbank, Ft. Sam Houston, Texas; Harry E. Kimble, Texas City, Texas; Charles C. Mann, Fort Slocum, N. Y.

First Lieut. Samuel H. Leslie, ordered to Fort Andrews, Mass., for duty.

U. M. Bryant, ACT.D.S., relieved from duty at Fort Sam Houston, Texas, and ordered to proceed to his home for relief from duty, after granting him eight days' leave of absence.

For the week ending May 30th—(No changes).

For the week ending June 6th:

Terry P. Bull, ACT.D.S., recently appointed, has been assigned to duty at Fort H. G. Wright, New York.

Dale E. Repp, ACT.D.S., recently appointed, has been assigned to duty at Fort DuPont, Delaware.

For the week ending June 13th—(No changes).

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY 1914.

May 5.

No. 1,095,449, to King Brooks and Wm. V. Owen. Dental tool.

No. 1,095,948, to Thomas D. Thurmond. Adjustable matrix for teeth-fillings.

May 12.

No. 1,096,195, to Dixie Roberts. Dental articulator.

No. 1,096,305, to John A. Johnson and Carl M. Hedman. Pneumatic potential producing means.

No. 1,096,447, to Adam H. Moeller. Device for manufacturing dental backings.

No. 1,096,712, to Ernest F. Greer. Skeleton crown and facing therefor.

May 19.

No. 1,097,520, to Frederick J. Bonnalie. Matrix device for use in stopping or filling teeth or for similar purposes.

May 26.

No. 1,098,008, to Ernest A. Ash. Tooth-paste dispensing device.

No. 1,098,331, to Carl Rauhe. Artificial denture.

No. 45,842, to Theodore G. Lewis. Dental molding flask. (Design.)

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

FULL UPPER PLATE RETENTION: A CRITICAL STUDY.

By CHARLES R. TURNER, D.D.S., M.D.,
PROFESSOR OF MECHANICAL DENTISTRY AND METALLURGY, UNIVERSITY OF PENNSYLVANIA.

(Read before the Connecticut State Dental Association, at its annual meeting, Hartford, April 20, 1914.)

IN presenting for your consideration the discussion of a topic in dental practice well-nigh as old as dental prosthesis itself, I need not offer an apology that the subject is one worn threadbare with time, nor yet promise to offer anything original toward the solution of a problem which arises in the design and construction of every artificial denture we are called upon to insert. My object is largely to undertake an analysis of the methods which have in the past been suggested to solve the difficulties of this problem, to plead that the needs of each case shall be diagnosed and met in accordance with individual requirements, instead of being treated by a common rule of thumb, and to provoke a frank discussion of the erroneousness or correctness of the conclusions reached.

GENERAL CONDITIONS INVOLVED IN THE RETENTION OF A PLATE IN AN EDENTULOUS UPPER JAW.

Given an edentulous upper jaw and the need for supplying substitutes for the missing teeth mounted upon a plate, what are the factors in the satisfactory use of this denture by the patient? The support of a full denture is of course derived from the mucous membrane covering the jaw upon which it rests. In the normal state this membrane is a firm, comparatively insensitive, and slightly elastic base which gives the necessary support to the base-plate. It offers sufficient resistance to the force devolving upon the plate during the mastication of food, and does this without protest providing the base-plate is constructed in accord with good mechanical principles, is adequately proportioned in its area to the stress which its use develops, and is maintained in a state of cleanliness. There are, of course, many variations in the resistance and elasticity of the supporting mucous membrane, which will be discussed later in another connection, but despite these differences, when in a state of health the membrane upon which the denture rests may be universally relied upon to give the desired support, and this phase

of plate usage may be dismissed from consideration when we are assured that the mucous membrane is in a condition of normal health.

If the denture is to be utilized it must of course be maintained in place upon this base, as obviously it could otherwise not be employed for its proposed functions, and would be useless. Its weight must be supported, and the plate stayed against other displacing influences. Our real problem, then, lies in the factors serving to maintain this plate *in situ,* or, in other words, with its retention. It will be seen at once that this is a vastly different question from that arising when bridges are inserted, as from the nature of their attachment they partake of the fixedness and firmness of the natural teeth used as abutments; or when clasp dentures are employed, as their maintenance upon their supporting base is rendered positive by anchorage to natural teeth. In the edentulous mouth, from the nature of the case, no such maintenance is possible, and the retention of a full plate must be secured by other means.

FACTORS CONCERNED IN THE RETENTION OF AN UPPER DENTURE.

To examine the factors in full upper plate retention it will be necessary first to distinguish two main divisions, each of which may then be considered in greater detail. These two factors have to do with the part played by the *dentist* in the design and construction of the denture, and that performed by the *patient* in the utilization of it after it has been placed in the mouth. An analysis of the dentist's problem shows that a denture must be designed which (1) shall not be subject to the displacing influences of the muscles of the lip and cheeks; (2) shall have its maintenance favored, and not adversely influenced, by the articulating relations of the teeth; (3) shall utilize advisedly and to the best advantage certain physical forces which serve to maintain such a plate upon its base of support, and (4) shall be of a form favoring the employment by the patient of certain co-ordinations of the muscles of the lip, cheeks, and tongue, which assist in holding it in place during use.

PLATE OUTLINE AND CONTOURS.

The first two of these factors may be spoken of as negative, in that neglect of their correct determination may serve to cause the denture to be readily displaced, and thus the positive retentive forces may be rendered insufficient. In order that the denture may not be subject to the displacing influences of the muscles of the lip and cheeks, its plate outline and its contours must be determined in accord with the actual conditions which each case presents. The plate outline or peripheral margins of the denture are to be discussed subsequently, so it is sufficient to say here that they must be laid down at points where the movements of the muscular structures of the lip and cheeks will not so greatly impinge upon the plate as to cause its detachment from the mucous membrane. The same restriction must be placed upon any contours which are added to bring about a restoration of facial contour. While theoretically it is desirable that every plate shall be absolutely free from these two displacing influences, it is not always expedient to lay down so fixed a requirement, as sometimes the other retentive influences are sufficient to counteract the adverse effect of a contour added to the plate—in the buccal region, for example, or at the canine eminence, where these additions are needed for the sake of facial restoration. It must be agreed, however, that the balance struck between these forces shall always be in favor of the firm retention of the plate.

ARTICULATION.

The large part played by the contact of the upper and lower series of teeth in maintaining an upper plate in place is evident to the most casual thinker. The leverage upon an upper plate in the incisor or molar region which the inci-

sion or mastication of a mass of food brings about is so great that the physical retentive forces at their best cannot resist it. With the mandible in the occlusal position and the upper and lower teeth properly fitting together, contraction of the elevators of the mandible should press an upper plate more firmly upon its supporting base. As soon, however, as the teeth are separated and a particle of food intervenes at only one place, the leverage upon the denture becomes active and tends to displace it. This may be compensated for in case of mastication with the molars, by interposing food on the opposite side, when the two displacing effects would neutralize each other. When patients wear artificial dentures in which no provision is made to obviate this difficulty, they soon learn that by keeping food between the teeth on both sides they are able to crush it with an up-and-down motion. Many dentures in use today admit of no other method of use, and their wearers are restricted to this method of mastication. The superiority of the natural method of mastication, in which the mandible is carried to one side before being brought into the occlusal position and in which the food is actually crushed on one side only has been clearly demonstrated by several investigators, and may be clearly substantiated by comparison of the results obtained by Drs. G. V. Black(1) and Joseph Head(2). Dr. Head demonstrated the greater crushing force of the triturating movements of the mandible. Briefly summarizing, it is evident that given articles of food could be crushed with an expenditure of about one-third to one-half the energy required in the direct up-and-down motion of the mandible. As is well known, Dr. Bonwill(3) was probably the first to recognize the value of the lateral movements of the mandible and of the desirability of simultaneous contact of the teeth of artificial dentures during these lateral excursions, and his well-known system was designed to secure a three-point contact between the upper and lower series of teeth during those movements of the mandible in which the artificial teeth are touching. The objects of this method are not only to permit the trituration of food, but also to maintain the dentures in place. (Fig. 1.) At the present time all are agreed as to the correctness of the fundamental principle which Dr. Bonwill enunciated, and all anatomical articulation of the day aims at simultaneous contact of the teeth of the dentures at three or more points during their contact relations, and the wisdom of this plan of arrangement of artificial teeth has been so amply demonstrated as to require no argument at this time. Whether the effort is made to obtain a balancing contact of a majority of both series of cusps and of the incisal edges of the front teeth, as one plan of articulation calls for, or whether a simple three-point contact, according to the plan of Dr. G. H. Wilson(4), is sought, the retentive value of Bonwill's principle is universally recognized. (Fig. 2.)

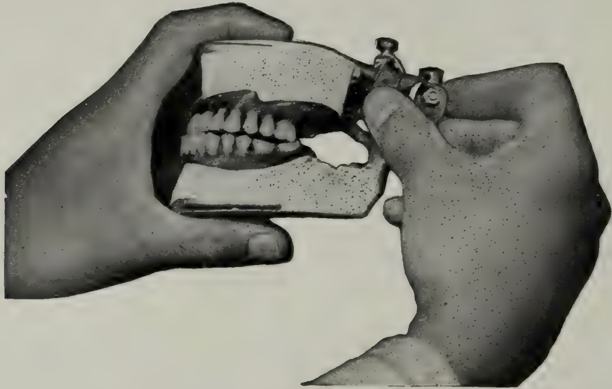
Fig. 1.

Balancing contact of teeth in position of forward bite. (Bonwill's method.)

More recently a contribution to the retentive value of the contact relations of dentures has been made by Ernst Eltner(5) in his solution of what he calls "the beer-pretzel" problem. (Fig. 3.) By omitting the second molars from each denture, he is able to arrange planes at the rear of each plate which may be maintained in contact during many movements of the mandible, when the teeth themselves are separated. This contact is preserved not only at all times when teeth themselves are touching, but can be maintained at other times as well, so

that when the mandible is protruded as for incision or thrown to one side for mastication, these planes slide upon each other, and food may be placed between the teeth and incised or crushed without displacing the dentures. While Eltner has worked out his plan for use only with his articulator, it is believed that it is applicable, with a slight modification, to use with any anatomical articulator.

Fig. 2.

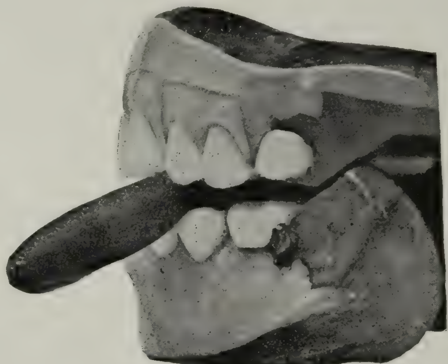


Wilson's method of securing a balancing contact in lateral excursion of the mandible. (Wilson.)

ADHESION AND ATMOSPHERIC PRESSURE.

The purely physical forces employed for the retention of full upper plates are adhesion and atmospheric pressure. The former may be defined as the molecular attraction existing between the particles of two bodies whose surfaces are in contact. It acts between two solid bodies, a solid and a liquid, or between either and a gas. Between two solids, the force of adhesion is directly proportional to the area of the surfaces in contact. It offers greatest resistance to a force tending to separate the surfaces which acts at right angles to them. Contact of the surfaces is essential, as at the moment when they are separated the adhesion is broken up. It is independent of atmospheric pressure, though the contrary is often erroneously assumed, for two surfaces maintained in contact by means of adhesion, when placed in a vacuum exhibit exactly the same amount of adhesive force. The amount of the adhesion between a solid and a liquid depends upon the area of the surface of the solid and the character of the liquid([6]). Thus a highly polished agate surface, an inch in diameter,

Fig. 3.



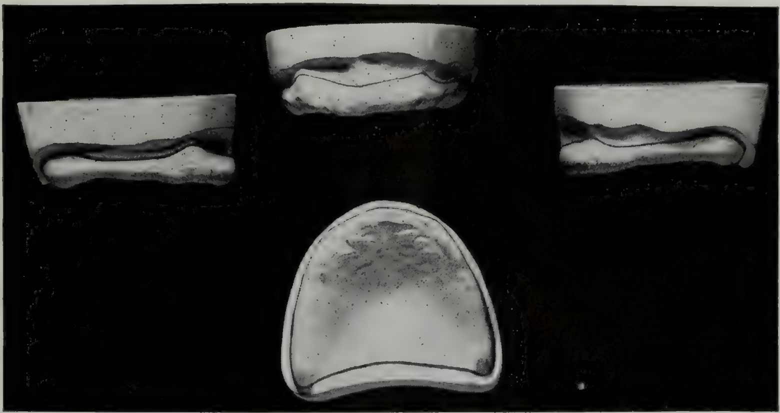
Eltner's method of securing contact of distal part of dentures during incision. (Eltner.)

when in contact with water exhibits an adhesive force of twenty-five grains, with sulfuric acid twenty-nine grains, with hydrochloric acid twenty-five grains, with almond oil sixteen grains, with

petroleum sixteen grains, with alcohol fifteen grains, and with ether ten grains. This likewise requires an exclusion of air and is independent of atmospheric pressure.

In the retention of a full upper denture by adhesion, we are dealing with a combination of the adhesion between two solid surfaces, those of the plate and the mucous membrane, and of each with an intervening thin film of saliva. The condition involves not simply the attraction between two solids or between a solid and a liquid, but it is a mixture of the two, and the adhesive force is stronger than either would be separately. It is certainly stronger than that between a solid and a liquid, as this is determined by the cohesion of the liquid, which is in most instances less than the adhesive force. We may easily demonstrate that it is less than the adhesion between two solids in the case of an upper denture, by thoroughly drying the mucous membrane and inserting the plate equally dry, pressing it into place, and requesting the patient to withdraw any remaining air between the two by suction with the tongue and throat muscles, when the adhesion will be found to be less than when both are wet with saliva. This is shown to be true clinically in those rare cases of dry mouth in which the secretions are very scanty, or in the case of patients to whom atropin is being administered, who note at once the difference in the retention of their plate. The saliva, then, has some part in this problem, and variations in its viscosity affect slightly the degree of adhesion, but ordinarily it requires no special consideration save the recognition of its function.

FIG. 4.



Normal plate outline. ("Am. Text-book of Prosthetic Dentistry.")

THE PLATE MARGINS.

The maintenance of a plate by adhesion presents several other interesting points for discussion. The first of these is the determination of the plate area, which should be as large as possible, in order to insure the advantage of the adhesion proportional thereto. Its confines are of course limited so as not to encroach upon movable tissue, which would serve to displace the plate from its base. (Fig. 4.) The structures for the free movement of which provision usually has to be made are the frenum of the upper lip, the attachment of the buccinator muscle, and the soft palate. At other points around the labial and buccal periphery the margin may extend up to the line of reflection of the mucous membrane from the alveolar ridge, with-

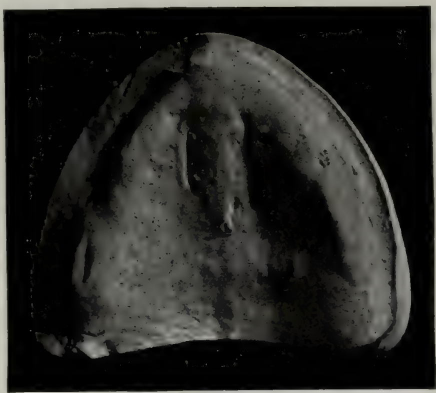
out danger of the displacing influence of these tissues, but it is often advisable to lay it down short of this in some regions, by reason of the effect exerted upon external contour by such extensions of the plate. Over the lateral incisor it is frequently advisable not to have the plate so high, because it is not desirable to make the overlying portion of the lip prominent. On the other hand, over the canine, when it is desired to make this region prominent, it is frequently feasible to have it even impinge slightly on this line of reflection of the mucous membrane. Across the palatal vault the plate margin is ordinarily placed anteriorly to a line denoting the tissue moved by the muscles of the soft palate, which may be readily observed in a mouth during the pronunciation of the syllable *ah*. As it is at this margin that air has most ready ingress to the under surface of the plate, it has often proved advantageous to have the plate margin slightly encroach upon this moving tissue, and to have its contact therewith somewhat accentuated, for a reason to which further allusion will presently be made.

EXCLUSION OF AIR.

By extending the labial and buccal plate margins as far up under the lip and cheeks as the consideration just discussed will permit, another of the factors favorable to adhesion is insured, and that is the exclusion of air. These structures act as effective barriers to the ingress of air to the under surface of the plate. It is often most useful to determine in a given case that balance between the defensive effect of these soft tissues and the displacing influence of their contact which will give the best result. It is well known that in a temporary denture in which these portions extending under the lip are omitted, we can depend very little on adhesion. (Fig. 5.) Further, in mouths with little or no alveolar ridge, part of the difficulty in retaining a plate is due to the easy ingress of air around these margins of the plate. In the mouth with well-defined alveolar ridge, a plate, with no special provision to secure good adhesion save perfect fit upon the tissues, cannot be detached by pulling downward on the front teeth as long as the lips and cheeks are applied to its outer surface, but by depressing it at the rear, air is admitted, and the plate is readily removed.

The vulnerable point for the admission of air is therefore the posterior margin. To overcome this natural condition, it has been proposed that the contact of this margin be accentuated, that it be arranged to press into the tissue and displace it slightly. The philosophy of this measure is that the elasticity of the tissue will cause it to follow the plate margin when the latter is depressed by the yielding of the tissues underlying the front of the plate to pressure in the region. The consistence and resistance to pressure of the tissues overlying the bone vary, and there is always some movement of the plate under pressure in consequence of the elasticity of the mucous membrane. In some mouths, when the bone has been resorbed extensively, there is much soft tissue covering the alveolar ridge, and in consequence much movement of the plate is possible. When the posterior plate margin rests upon the soft tissue, this accentuation of its contact is very desirable. It is

FIG. 5.



Cast of upper jaw with almost no alveolar ridge. ("Am. Text-bk. Pr. Dent.")

only in the median line along which the hard ridge courses that there is ever any difficulty in carrying out this measure. Occasionally the plate margin must be carried backward in its center to reach soft tissue, and once in a while it is even justifiable to have it encroach slightly upon the movable soft palate to gain the desired end. It goes without saying that the advantage gained by this extension and by this pressure into the soft tissues must fully overbalance any depressing influence of the measures. Furthermore, the extension of the plate may sometimes have to be omitted, because of its encroachment upon sensitive areas and the production of nausea.

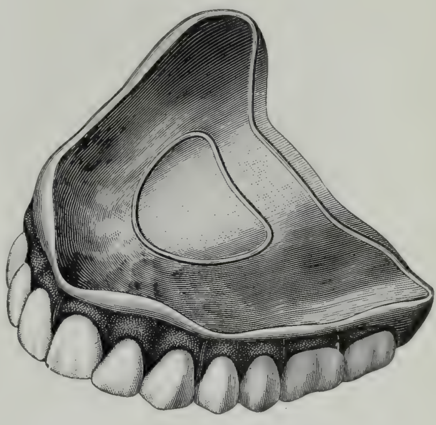
MARGINAL CONTACT.

An accentuation of marginal contact around the whole periphery of the plate is a good measure. It must be employed advisedly, however, and with due regard to the character of the tissue underlying the margin at each portion of each case, for it varies markedly at different parts of the same jaw. It can only be determined by a careful examination of the case under consideration.

Several measures are in vogue for heightening this marginal contact. The raising of a bead upon vulcanite dentures by carving a groove within the margin outlined on the cast with a spoon excavator, as described by W. Storer How(7), and by the soldering of a half-round wire, gage 20, at this point on a swaged metal plate, insures uniform pressure around the margin. (Fig. 6.) This subsequently requires the trimming down of the bead at places in the mouth which are hard and become irritated by it. Another method, with which the writer is more in accord, consists in scraping down the plaster cast around the periphery with a small Kingsley scraper, not making so pronounced a bead, but making the groove on the cast very shallow, never more than 1/75 inch deep, and wider than the bead suggested by How, tapering toward the margin. Across the palatal vault this bead should stop short of the margin, since otherwise the tissues, as they are drawn over this edge, would be irritated by it. It will be seen that this can only be done by consulting the mouth itself during the alteration of the cast.

One of the virtues of the adhesion obtained by the Green brothers'(8) method of impression-taking with modeling compound is undoubtedly due to this accentuated marginal contact, for besides a compression of the soft tissues over the whole plate area by the material, this method aims to secure special pres-

FIG. 6.



Beaded plate. (How.)

sure at the periphery. By their plan, after the material is first pressed into place, the impression is removed and cooled, and by tracing on more modeling compound around the periphery and replacing the impression, it is pressed into place. This detail of the method commends it to use, no matter how one may feel about its attainment of the other object aimed at.

It is often erroneously stated that these methods make a vacuum chamber of the whole plate, and that atmospheric pressure and not adhesion is then the retentive force. For atmospheric pressure to be operative, it would be necessary for a space to exist beneath the plate, and this space would have to be a complete or partial vacuum. Such an arrangement would throw the whole

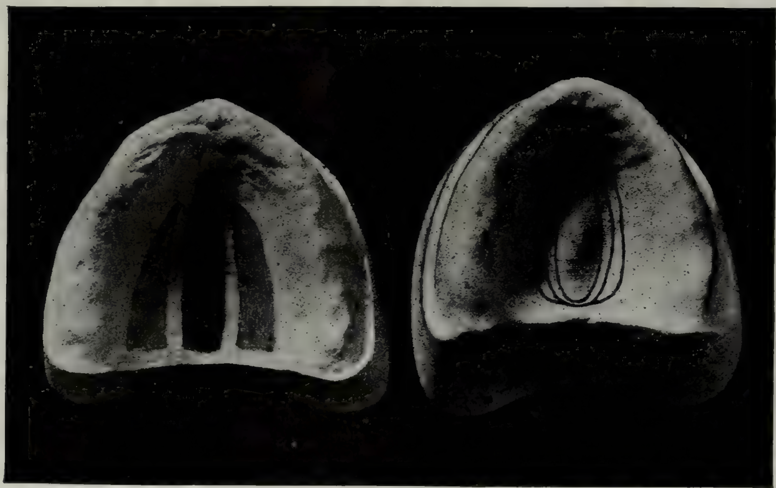
bearing of the plate upon the raised margin, the impracticability of which is evident. The raised margin must not hold the plate out of contact with the jaw. The air must frequently be withdrawn by the patient in order to secure complete contact of the plate, but when the surfaces are fully touching and no space intervenes, it is adhesion which serves to maintain the plate.

The practice of employing soft, flexible rubber rims to exclude the air is mentioned merely to condemn it, for the quick disintegration of the soft rubber frustrates its purposes and renders the plate unfit for use.

HARD AND SOFT AREAS OF THE PALATE, AND METHODS FOR COPING WITH THESE CONDITIONS.

There is another problem in relation to adhesion which must also be settled, and this arises from the familiar fact of the unequal resistance offered by various portions of the membrane supporting the plate. The skeletal foundation is all hard, but varying amounts of soft tissue overlie it. (Fig. 7.) In most mouths, the median ridge denoting the central suture is hard, with soft tissues adjoining it on either side. The alveolar ridge under favorable conditions is fairly resistant, though less so than the central ridge. Under conditions of great bone resorption, there may be abundant soft tissues over the alveolar ridge, and in other mouths it exhibits here and there hard nodular areas. In an appreciable number of cases, a hard, bony, tumor-like mass occupies the median line. When pressure is applied to a plate made over an unaltered and anatomically correct cast, the soft tissues are more readily compressed, and the plate impinges upon the hard areas. As pressure is normally applied along the line of the alveolar ridge, if this is softer than the area along the median line, the plate will not be uniformly supported, and if one side is pressed up more than the other, the latter may be detached, air admitted, and adhesion destroyed. If this is true of what may be called the normal cases, those which exhibit very soft alveolar ridges or hard nodular areas, or both,

FIG. 7.



Full upper cast (on left), showing hard areas shaded heavily and soft areas shaded lightly. On right, cast showing lines drawn to indicate size of three layers of tin foil added to relieve the hard areas of pressure from the plate. ("Am. Text-bk. Pr. Dent.")

present a further difficulty which all recognize must be overcome. Let us analyze the two methods proposed to deal with this phase of the matter. In one a material, such as modeling compound, which requires some pressure to bring it into place is used in taking the impression. This compresses the soft tissues and condenses them into a resistance similar to that offered by the hard areas. If this method required the exertion of force equal to that applied to the plate in use, and if it did not displace the tissues as well as compress them, in this respect it would be ideal, and from a cast obtained in this way a plate could be made which would have a uniform bearing. In the average type of mouth it is more important that the plate *should not press* on the hard areas than that it *should press* upon the soft ones. It would seem safer, therefore, to secure an anatomically correct cast from a plaster impression, and, by comparison with the mouth, to make judicious additions to it over the resistant portions. These may be made of varying numbers of layers of No. 60 tin foil, one overlapping the other beneath it, and made to adhere with liquid silex. (Fig. 7.) A careful digital examination determines the relative compressibility of the parts. From three to five layers will suffice for most hard nodular areas; the median line of even the most uniform jaw should have two layers. The standard of compressibility should be the alveolar ridge, and the relief of hard areas should be made to conform therewith.

When the alveolar ridge itself is much softer than our standard of compressibility we have another type to deal with and the plate should press upon it more. We may then either resort to the modeling compound impression method of compression, with its attendant danger of displacement of the soft tissues, or we may judiciously scrape down the soft areas represented on an anatomically accurate cast obtained from a plaster impression. The writer prefers the latter method, though he is aware of the objections to its lack of accuracy; it must be employed only in careful consultation with the mouth itself.

THE VACUUM CHAMBER, AND ITS LIMITED USEFULNESS.

Atmospheric pressure is utilized in the retention of upper dentures by providing a space in the plate surface next to the tissues from which the air is partially withdrawn by suction through the action of the tongue and throat muscles. This principle has been employed in dentistry for a long time. Dr. William Trueman(9) attributes its first use to James Gardette about 1800, and says that it was not employed to any extent until plaster was used for impression-taking and vulcanite came into general use. W. H. Gilbert, a confectioner of this city, was credited by various dental organizations with originality in the device, about 1840, and Dr. John A. Cleveland, a dentist of Charleston, S. C., secured a patent upon a vacuum chamber of somewhat different form in 1850. While there has been and probably always will be much discussion as to the advisability of employing this adjunct to plate retention, so many prosthetists with wide experience in its use have pronounced against it, that the case against this device seems to be pretty well established on both theoretical and practical grounds. The opinions voiced in a symposium of articles on this subject by dental teachers, published in the *Items of Interest* in 1901,* were preponderantly against it. The judgment of the writer is that its use should be limited to a few cases which will presently be described. (Fig. 8.)

The principle of its use is familiar to all. The partial exhaustion of the air from the vacuum chamber causes the pressure of the atmosphere upon its lingual surface to maintain the plate *in situ*. The air is withdrawn by the action of the tongue and palatal muscles, which create a partial vacuum in the mouth

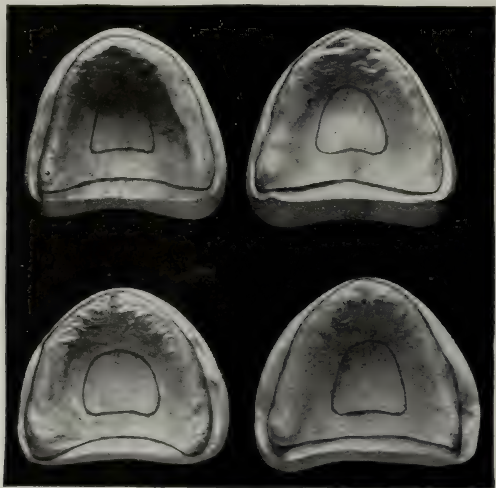
* See *Items of Interest* for February 1901, vol. xxiii, p. 89.

just back of the denture, and air is drawn from beneath the plate. It is estimated that under the most favorable circumstances it is possible to obtain with a vacuum chamber three-quarters of a square inch in area, a sustaining force of about two and one-half pounds. This is of course augmented by the adhesion of the denture. The vacuum can never be perfect, and, after a short while, owing to leakage, the air is only partially rarefied.

so reduces the retentive value of the device that its use is not justified; also the irritation of the soft tissues at the edge of the chamber is a serious drawback to its use.

It is never safe to say that anything may not serve some useful purpose, but it is absolutely certain that the vacuum chamber ought never to be a sole reliance for retention. From the nature of the case it cannot be, and the other factors concerned in the matter should be utilized to their full extent. Furthermore, it should never be used without such careful attention to the technique of its construction that all of its serious disadvantages are avoided; and it should never be used when satisfactory retention may be secured without it.

Fig. 8.



Casts with plate outline and form of vacuum chamber marked upon them. ("Am. Text-bk. Pr. Dent.")

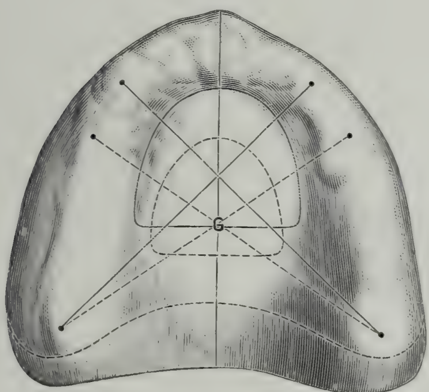
The advocates of this method maintain that by its use in the beginning, the retention of all upper plates is improved; that even if it is of only temporary utility, this primary firm retention tides the patient over that trying period during which practice in the use of the denture is being acquired. They further say that, despite the drawing of the mucous membrane into the cavity, the latter is never completely filled, and some service is still performed; also that the space affords a relief of plate pressure upon the hard areas found in the center of all mouths. On the other hand, it may be argued that in course of time the drawing-in of the mucous membrane

Burchard (10) has given us the logical method of locating it to coincide with the center of gravity of the plate. (Fig. 9.) That its form should correspond to the general alveolar outline seems to be generally agreed upon for practically all cases, despite the various other forms which have been suggested. That it should neither be too large nor too deep no one will question, and that its edges

should insure a positive but not irritating contact with the tissues is an evident necessity.

It may be used advantageously in some very flat and soft mouths, in those which are very soft in front, in temporary dentures from which the labial portion is omitted, and in some partial dentures where contact of the plate with natural teeth gives additional support. In the vast majority of cases, it is advisable to omit the vacuum chamber; the retention, after a first short period of trial, is infinitely less reliable.

FIG. 9.



Burchard's method of locating the vacuum chamber. (Burchard.)

Soft rubber disks, surface "cohesion forms," and all similar devices are not recommended, owing to their obvious disadvantages. Springs need not be discussed, as their use is obsolete.

THE PATIENT'S PART IN THE RETENTION OF A FULL UPPER DENTURE.

There remains for us to consider the final factor upon which the retention of a plate depends; that is, the part contributed by the patient. It is said that the late Dr. Flagg used to remark that "a patient could eat with a chip of wood, if he would only stick at it long enough." Contained in this homely metaphor is the gist of the truth which we shall try to point out concerning the patient's part in the maintenance of the plate. Given a plate constructed *secundum artem,* it then devolves upon the patient to learn to use it. The teeth are but substitutes for the natural organs, and even under the most favorable conditions of plate retention, the patient can rarely proceed at once to use them satisfactorily for mastication. The purely physical factors seldom maintain the plate so securely that the methods of mastication in use with the natural denture succeed with the artificial one. In every case, then, something must be contributed by the patient, and in those cases unfavorable for the operation of the physical retentive means already described, proportionately more is demanded of the wearer of the plate. In those instances in which extensive loss of the alveolar ridge has ensued, the utilization of the plate is practically independent of mechanical retention, and is brought about solely through the muscular activities of the patient. The use of the plate entails the cultivation of new muscular co-ordinations, and these are of two varieties—those of the lip, cheek, and tongue, which serve to hold the plate up, and those of the mandible, which during mastication tend to press it in place and not dislodge it.

The lip and cheeks grasp the sides of the denture and hold it in place. The irregularities of the outer surfaces of the denture are favorable to the grasp of these muscular structures, but the activity may be much favored by the making of a projecting rim around its buccal and labial borders. Every denture may, with advantage, be supplied with such means of assisting the muscles, and in some dentures these are the most important means of support. The writer (11), some years ago, reported a case of syphilitic necrosis, in which one of the antra was perforated, the entire alveolar process having been lost and the roof of the mouth being almost a plane surface. The use of springs in this case seemed inadvisable because all of the lower teeth remained intact. A vulcanite plate was made with a projection in the buccal region which avoided the anterior margin of the masseter muscle, and which fitted into a depression in the cheek located above the position of the risorius muscle. The patient's cheek was some-

what distended by the appliance, but in course of time a marked depression was made in the muscular structures of the cheek, and the patient learned to maintain the denture satisfactorily in place.

The rim ordinarily used need only be of moderate size. (Fig. 10.) When it is a factor of prime importance it should be pronounced, because this makes it more efficient, helps to keep the soft tissues away from the teeth and prevents

FIG. 10.

Plates showing three variations in size of marginal rim.

cheek-biting, though the overhang of the upper buccal cusps should be enough to assist in preventing this.

The tongue learns to hold the denture up, and at the same time to press the food between the teeth during mastication. It is believed that the roughened lingual surface existing when rugæ are made upon the denture is of material assistance to the tongue.

Patients also acquire new methods of mandibular movement, as they soon learn that certain ones do not displace the dentures. They often begin with the straight up-and-down motion, simultaneously crushing similar amounts of food on each side, and later they extend the mandibular activities to lateral excursions with dentures the articulation of which permits it.

All patients should be informed as to what will be required of them in learning to use a new denture. When physical retention is poor, they should be told that it practically all depends upon their own efforts. They should be instructed as to the means of acquiring the use of the denture, and encouraged to persevere to attain it. It is unfortunate that at the plate-wearing age, the acquisition of new co-ordinations is slower than in earlier years. When the young are unhappily consigned to a plate, they have the good fortune of learning to use it quickly.

The dentist likewise should take comfort in the thought that the failure of some dentures is not to be laid at his door, if their construction has been in accord with correct principles, and the patients have not learned to use them. This knowledge should not lessen his responsibility; it should make it greater, for he is obligated to do all in his power to insure a successful use of the appliance.

CONCLUSIONS.

We may, then, briefly summarize our conclusions as follows:

The denture should be as free as possible from the dislodging influence of moving tissues.

The articulation of the teeth should promote retention as well as satisfactory functional activity. Adhesion is the chief physical force employed, and in every upper plate it should be utilized to its full advantage. The best adhesion is obtained by the judicious alteration of the face of a cast obtained from a plaster impression.

The vacuum chamber should never be solely depended upon for retention, and should seldom be used at all.

Rims and rugæ assist the patient in the retention of all dentures.

The patient should be instructed in and informed of his part in the satisfactory employment of the plate.

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[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, D.D.S.Univ.Pa., L.D.S.Edin., Edinburgh, Scotland.

(Continued from page 825.)

(IV.)

CHAPTER VII.—FITTING THE CAP AND POST PREPARATORY TO TAKING THE IMPRESSION FOR THE CROWN.

In the foregoing chapter has been described the shaping and trimming of the various classes of teeth, and it is now proposed to deal with them in the same order with regard to the fitting of the bands and posts. Various methods are recommended for determining the circumference of the root and for obtaining a model of its outline. Perhaps the most common is to encircle the root with a loop of annealed brass or steel wire about 33 gage, using a Kirk dentimeter and twisting the wire until the loop fits tightly; or a small pin-vise may be used, and the wire, after being tightened, burnished to fit any irregularities of the root. In the case of the front teeth or bicuspids the ends of the wire loop are most conveniently twisted on the labial surface, whereas in the molars the lingual surface is better. The wire should be carefully slipped off the root and the loop placed upon a piece of tin or lead. Over this is placed a piece of flat iron, and with a blow from a hammer on the iron the wire is driven into the tin or lead. This gives an exact impression of the root. The wire should then be cut at the point farthest from the twisted ends and each end of the loop straightened out at right angles. A piece of 22-karat gold plate, 28 gage, or a piece of platinized gold plate 30 gage, of the required width, should now be taken and cut a trifle longer than the wire pattern, so as to allow for slight overlap, care being observed not to use too broad a strip, as the difficulties of fitting are

thereby increased. Proceed now to fit the band to the impression made in the tin or lead, and before uniting the edges try the band on the root, and having ascertained that it is the right size, proceed to join the ends of the band together, either by sweating or soldering them, but before finally adjusting the overlap thoroughly anneal the band so that it will not spring during the process. Where sweating is resorted to, it is a matter of little importance where the joint is situated. Usually it is suggested to have it interstitially or on the lingual surface, but the writer prefers to make the joint on the labial or buccal

Fig. 63.

Section of gold band, to show method of beveling inner edge preparatory to joining. Thickness of gold exaggerated in order to show bevel.

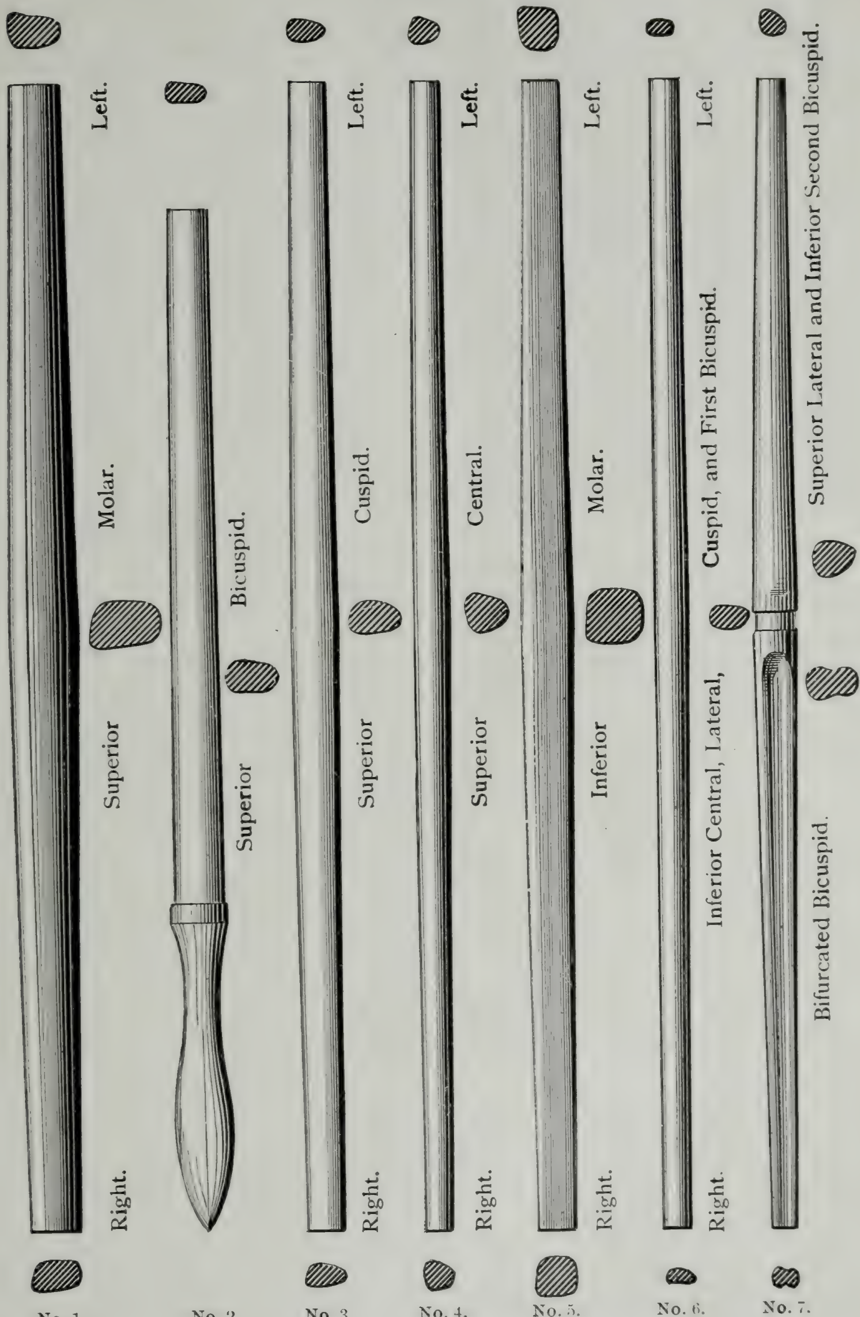
surface, finding it easier to fine-fit the band to the root and note the amount of overlap. Sweating is preferable to soldering, but of course requires more skill; this, however, can soon be acquired by a little practice. The method whereby sweating can be accomplished is as follows:

The inner edge of the overlap (Fig. 63) should be beveled and the surfaces brought into accurate contact, and the joint coated with thick borax. The band should now be grasped with the tweezers at the point farthest away from the joint, which should then be sweated in the Bunsen or alcohol flame and not by the blowpipe, the flame being turned low so that the heating will be more even and under better control. When the band has become quite red, the borax will be seen to flow. This must not be mistaken for the union of the two pieces, but the heating continued for a moment, when the gold will be seen to flow. The band must then be quickly removed from the flame, and if skill and care have been used, the union of the surfaces will be found to be perfect. The thickened joint may now be either filed down or, if on adjusting the band it is found a trifle too small, it can be easily enlarged by tapping the thickened edge with a riveting hammer on the round spur of the anvil. Another method which yields excellent results is to take the circumference of the root and make a band of the required size and shape it on a mandrel, and for this purpose the set of mandrels introduced by the S. S. White Dental Manufacturing Co. are admirably adapted (Fig. 64). There is yet another way which will be found useful, indeed sometimes indispensable, where there is much difference in the level between say the lingual and labial, or lingual and buccal, surfaces of a root—as for instance, when decay has extended to or below the margin of the gum. In such cases it is often difficult or even impossible to obtain an accurate outline of the root by means of the wire loop, and here a model is of advantage. It may be obtained in the following way: Take a small piece of dental lac* or modeling compound about the size of the first joint of the little finger, and just pliable, not too soft. Soften the surface with which the impression of the root is to be taken by passing it once or twice rapidly over a Bunsen or alcohol flame and mold it with the fingers to the surface of the root, pressing it hard into place. If this does not give a sufficiently sharp impression—and it usually does if lac is employed—then remove, chill thoroughly, and replace with a thinnish coating of inlay wax over the surface; place once more on the root, and force hard home. Cast the impression with quick-setting cement or plaster, and fit a band to it, but do not unite the ends till it has been fine-fitted to the root.

In the matter of fitting bands to roots it is essential that they fit accurately

* First suggested and described by the writer in a paper "A New Impression Material," read before the American Dental Society of Europe, at Cologne, April 1901.

FIG. 64.



Mandrels for shaping seamless tooth-root collars.

without irritating the gum or the pericementum, and this can be done by the expert whose intuitive knowledge combined with experience enables him to gain the desired end with the simplest appliances, by fitting the bands directly to the roots.

Having spoken, then, of the general methods of band construction, the various classes may be briefly dealt with.

Front Tooth Bands.

Having formed the band by one of the methods described, the next step is

Fig. 65.

Fig. 66.

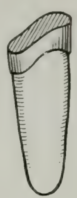


Fig. 67.

Fig. 65: Band on root showing line of festoon of gum marked on outside of band.

Fig. 66: Band on root after being cut to follow festoon of gum.

Fig. 67: Band after being ground down on root.

to fit it on to the root. It will be found that the line of the gum rises interstitially, thus forming an irregular cervical margin. With the band in position on the root, mark on the outside with the point of a sharp instrument the line of the festoon of the gum (Fig. 65). Remove the band and trim to this with the crown scissors, and repeat the operation until the edge of the band when placed on the root touches the gum all the way round (Fig. 66). The edge of the band should next be beveled from the outer to the inner edge, after which it should once more be placed on the root and marked with the aid of a sharp-pointed instrument. It should then be once more removed and cut down to the mark. When it has been replaced on the root, proceed to reduce the surface of the root and band together until no gold shows on the labial or buccal surface, and not more than 1/32 of an inch on the lingual or palatal (Fig. 67). With regard to cutting down the labial surface, it is well to remember that this should be well below the gum line, as there is the added thickness of the gold cap to be accounted for.

The next step is to solder on the cap. While 22-karat plate, size No. 32, may be used for this purpose, yet it is better in some cases to use pure gold of the same thickness, as it can be more easily burnished to conform accurately to the surface of the root. To remove the band with the least risk of distortion, insert a fine hooked probe beneath the gum margin, slip it over the edge of the band and so detach it. Now borax the pure gold and place the band upon it, and with the tip of the thumb or forefinger, or with a piece of soft vulcanized rubber, press the pure gold to place so that it fits the edge all around. Having thus fitted it, borax the joint in the usual way and with a small piece of high-grade solder unite the band and cap. This is best done by holding the cap and bands by means of tweezers in the Bunsen flame. Should the joint not be made complete at first, no further effort should be made to finish the soldering until the cap and band are pinched together, when the union may be completed by means of another small piece of solder. The excess of gold should then be trimmed off and the cap replaced on the root. If a small hole is punched in the center of the cap it will be found that it may be forced into place much more easily, for if the band and cap have been properly fitted they will be found to form an air-tight joint when placed on the root.

The next step is to adjust the post in the canal, the size of which will be determined by the type of root and the strain to which the crown is liable to be subjected. Generally speaking, it should correspond to No. 2 of Peeso's reamers, which corresponds with No. 4 size of dental alloy wire (about 13½ U. S. G.), and this in turn with the tube in

the non-platinum tube tooth. The post should be tapered to follow as nearly as possible the shape given to the canal by the reamer, and this may best be accomplished by holding the wire in a pin-vise and imparting to it a rotary motion by holding it between the thumb and fingers and while so doing drawing the file across the wire at right angles, while at the same time it is supported in a groove in the bench block (Fig. 68); or the wire may simply be held in the fingers and rotated at the same time as the filing is being done (Fig. 69). This enables a perfectly round and evenly tapered post to be formed. and can be quickly done after a little practice.

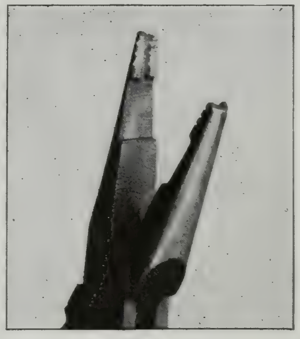
FIG. 68.

FIG. 69.

Showing methods of tapering the post.

Before the cap is placed on the root, the pointed end of the post is inserted into the canal and pressed home into place; next, the required length, which should be sufficient to reach the incisive edge of the crowns of the adjoining teeth, is measured off. Having removed the post from the root, cut it to the required length, place the cap on the root, and burnish carefully to the surface. Then with a pair of rough-pointed pliers (Fig. 70) grasp the post firmly, place the pointed end through the small hole originally made in the cap, and so force the post home. Now mold a small piece of temporary stopping around the projecting end of the post and force it down on the surface of the cap, meanwhile taking care not to allow the end of the post to project through the gutta-percha (Fig. 71). While still soft, grasp the post through the gutta-percha with the pliers (Fig. 72), the cold metal chilling it sufficiently for the purpose required. Next remove the post, cap, and gutta-percha together—or, if the cap does not come away, it can be replaced on the impression in the gutta-percha, where it may be fixed with a touch of sticky-wax. It can now be invested and soldered, using a very small piece of

FIG. 70.



Roughing pliers.

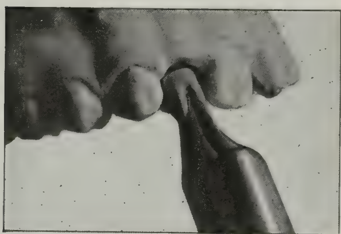
solder to unite cap and post; or it may be soldered without investing. It will be observed that in the inside of the cap, part of the pure gold has been turned in along with the post. With a pair of

FIG. 71.

Shows post with temporary stopping molded around it.

strong tweezers pinch the pure gold firmly against the post, and grasping the tapering end of the post in a pair of tweezers, hold in a horizontal position while carefully withdrawing the gutta-percha. Next borax the joint, place

FIG. 72.



Shows method of grasping post through gutta-percha.

upon it a small piece of solder and flow it by means of a large soft flame in the blowpipe. By this means the time spent in investing and heating up a bulk of investment material is done away with. Of course it is a more risky method, and if one is not confident of his skill, and time be not a serious object, it is safer to invest. When doing so, only a very small quantity of investment material need be employed, and it is to be noted that the whole must be thoroughly heated up before any attempt is made to flow the solder.

The cap with post attached should now be placed on the root. The pure gold being very pliable and the pin very lightly attached to the cap, cap and band may be burnished to place, and while this is being done it is well to hold the post firmly. By way of making sure that the post is driven right home, a few light taps may be given to it with a hammer. The position of that part of the post projecting above the cap must now be considered. It should be in such a position that when the crown

FIG. 73.

FIG. 74.

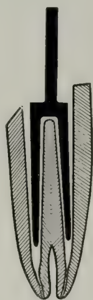


FIG. 75.

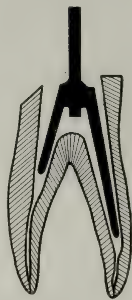


FIG. 73: Showing how to bend post by notching with file just above surface of cap.

FIG. 74: Showing upper bicuspid with two posts parallel and of equal length.

FIG. 75: Divergent posts in upper bicuspid, one post a short one, to enable cap and posts to be placed on root.

is finished it appears on the lingual surface immediately behind the incisive edge, and in most cases it will require no bending, but if this is required it may be done either at this stage or later when the impression has been cast and the model obtained. To facilitate bending the post, a pin-bender should be used, or a notch may be made immediately above the surface of the cap in the side of the post to which it is to be bent (Fig. 73), and the necessary inclination given to it by means of an ordinary pair of pin-bending pliers. With regard to the upper lateral incisors the methods already spoken of are also applicable, with this exception, that as the roots of these teeth are smaller, the

canal should be reamed to No. 1 Peeso reamer; then size 30 gage usually gives a stout enough band for these. The upper canines, too, are to be treated in the same way as the centrals, care being observed to take advantage of the full length of the canal and thus obtain as long a post as possible, not only because this is an advantage in obtaining the necessary strength which the position and size of this tooth call for, but also because this root may be required later as anchorage or support for a bridge.

Passing now to the upper bicuspids, the technique of band-fitting and capping is the same as that for the front

Fig. 76.

Fig. 77.

Fig. 78.

Figs. 76 and 77: Show posts for double-rooted teeth.

Fig. 78: Shows post bent to proper angle for tube crown.

teeth. There is, however, an important modification with regard to the post or posts. In the first bicuspid there are nearly always two canals, and sometimes in the second also, but the roots being more slender than in the front teeth, the canals should only be reamed out to No. 1 size Peeso reamer. This will necessitate a slight reduction in the size of the post used, but the same size of wire, *i.e.* No. 4, may be employed. After the cap is placed in position, the posts are to be adjusted as in Figs. 74 and 75, where it will be seen that they are sometimes parallel, and in other cases considerably divergent. If the divergence be very marked the more suitable canal may be selected for the stouter post, whereas in the other canal a shorter post may be used.

These double posts may be formed in the following manner: Take two short, straight lengths of wire, tapered to fit the canals and flush with the surface of the root, and join these together by means of solder to a straight piece of wire to carry the crown (Fig. 76). In order to do so they should be invested, although this is not essential, as when one has had a little experience the distance apart between the posts which enter the roots can be accurately judged by the eye and the parts united on the soldering-block; or a loop may be formed as in Fig. 77 and a straight length joined to it to carry the crown; or a selection of these may be kept on hand which with a little adjustment can be quickly adapted to suit any case. When only a single root is employed to afford anchorage, the post may be bent as in Fig. 78 and

Fig. 79.

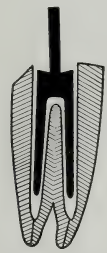


Fig. 80.

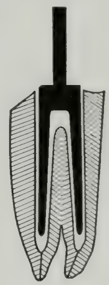


Fig. 79: Shows junction of posts below surface of root. (Correct way.)

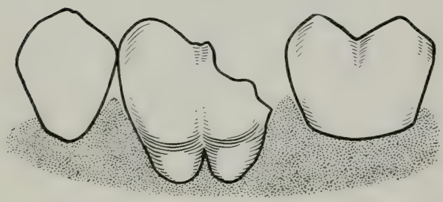
Fig. 80: Shows junction of posts above surface of root. (Wrong way.)

anchored into one root—generally the lingual, as this is usually the stronger; or a single straight post may be used, as mentioned in Chapter IV.

Whatever method is employed, care must be observed to hollow out the base of the pulp chamber and the entrance to the root-canals, with a view to accommodating the junction between the post and the bend in the case of a single post, so that it does not rise above the general level of the surface of the root (Fig. 79), otherwise it would be necessary to hollow out more than is desirable of the base of the crown, which in consequence would be unduly weakened (Fig. 80). The pure gold cap is now to be burnished into the depression made before the post is soldered, and if by

accident this should be torn or split and so made too large, a hole should be punched with a rubber dam punch in a small piece of pure gold, which should be slipped over the post and burnished to place so as to fill up the gap. The post and cap are then to be removed in the manner described in the case of the front teeth. Or, if preferred, a very small impression in plaster or dental lac may be taken of cap and post, and these removed and soldered in the usual way.

FIG. 81.



Showing upper molar with gum receded, exposing buccal roots.

Coming now to the upper molars, the fitting of bands for these may be carried out by one of the methods already described. There is, however, a type of molar root, both upper and lower, which can be more easily and accurately fitted with a band in the manner presently to be described than by any other means suggested. The type of case to which reference is made will be seen by a glance at the accompanying diagram (Fig. 81). From this it will be observed that the roots, generally owing to caries or recession of the gum, have been all but divided, and in consequence—in the case of an upper molar—this will take the form of a deep V-shaped space between the buccal roots and a less pronounced but well marked incurving between the palatal and buccal roots (Fig. 82). Obviously, here the difficulty is to get accurate adaptation of the band into the sharp angle between the buccal roots; and the method whereby this may be best accomplished is by so fitting the band that the free ends, which should be tapered from the outer to the inner edge (Fig. 83), are directed into the buccal space, thus forming almost a knife edge, and then soldered. This enables a firmer grasp of the roots to be obtained, particularly in a line drawn through the center of the buccal roots and the palatal root. In the case of the lower molars where a like condition is met with—namely, when there is almost a complete division between the roots—the band may be made in two sections, one to fit each of the roots, and the free ends of these tapered from the outside toward the inner side almost to a knife edge, and then soldered together (Fig. 84). This gives even a stronger grip in the lower than in the upper molar, and is nearly equal to two separate bands when joined together.

FIG. 82.

Shows transverse section of upper molar at about level of floor of pulp chamber.

FIG. 83. FIG. 84. FIG. 85.

FIG. 83: Shows band for Fig. 81 with proper flanging of edges. Thickness of gold much exaggerated.

FIG. 84: Band for lower molar in which gum is much receded, exposing space between roots.

FIG. 85: Upper molar with pure gold cap burnished into pulp chamber.

Consider now the post in upper molars. As the lingual root is by far the strongest, it should be utilized for reception of the post; and as a fairly long one is usually obtained, it is generally all that is necessary. If, however, owing to some abnormality, such as curvature

of the root, or from any other cause, only a short post can be obtained, then a supplementary post may be introduced into one of the buccal canals, preferably the anterior one. Should there be any doubt regarding the sufficiency of the anchorage, this may be further increased by shaping the walls of the pulp chamber and burnishing the pure gold cap to fit it (Fig. 85), and the manner whereby this may be most easily done with the least danger of perforating or damaging the cap is to take a lac impression of the surface of the root while the band is in position. Remove the impression, when the band will usually come away with it, or if not it can be removed and placed in the impression, when a pure gold cap may be swaged to fit it by means of Ash's "crown-swaging device"—which consists of a cylindrical plunger and a soft rubber pad. Another method is to burnish carefully a pure gold cap to the band, and if care is taken and the cap frequently annealed an accurate adaptation to the pulp cavity may be had with little difficulty. Should the gold be perforated or torn, an additional piece of pure gold may be placed over the damaged surface and burnished to place. Still another method is to chill the impression thoroughly and slightly oil its surface. Take a piece of softened lac about the size of a hazel-nut and place it on a piece of lead. Press the impression into this, then thoroughly chill with cold water, when they can be easily separated. Probably the band will come away with the model, but if not it must be replaced upon it. The lac die and counterdie thus formed will, if kept chilled, prove strong enough for the purpose of burnishing and swaging the pure gold cap to an accurate fit, and in the process of burnishing the pure gold cap may require to be annealed several times. As an alternative to a lac model the impression may be cast in quick-setting plaster and the model hardened. Proceed then to unite the cap to the band in the usual way. Next place the cap and band on the root and burnish once more, adjust the post or posts as described in the case of the first bicuspids and proceed to solder these together. It will be observed that owing to the position and angle of the post, where only one is used, the part which projects above the cap will not be in the center, and this will apply also when more than one post is used. The method, however, whereby the central post which is to carry the crown is to be attached to the cap, will be dealt with later.

The lower central incisors. The manner of banding these is similar to that of the upper incisors; the exception to be noted with regard to the treatment of these roots is to guard against excessive reaming-out of their canals and thus avoid the risk of perforation. For this purpose the small special size of Peeso reamer previously spoken of is useful; or the No. 12 right-angle Beutelrock's drill may be employed, and with a slow rotary motion in the direction in which the reamer is revolving, combined with an up-and-down motion, the canal may be safely enlarged to admit of No. 3 tapered post.

The lower canines and bicuspids call for no special mention, as they may be treated precisely in the same way as the other single-rooted teeth. With regard to the lower molars, however, these present the difficulties associated with a multi-rooted tooth, in which, generally speaking, only one canal is suitable for anchorage. Fortunately, the posterior one generally admits of a fair-sized post, and when from any causes such as those mentioned in connection with upper molars the canal cannot be reamed out to receive a fairly long post, one or both of the canals in the anterior root can usually be counted upon to afford the necessary supplemental anchorage. If doubt should exist regarding their efficiency for this purpose, the pulp chamber may be so shaped as to afford additional anchorage, as already described. Here again, as in the case of the upper molars, the post does not project in a central position, and while in certain cases it can be bent to a suitable angle for the purpose of carrying the crown, a separate post has usually to be added.

The Fitting of Bands for Shell Crowns.

The all-gold or shell crown need only be referred to briefly, because the description already given regarding the making of bands and caps for tube crowns is applicable to the all-gold crown, with some slight modifications with regard to detail. The band instead of being a narrow one must be of sufficient breadth to come almost in contact with the teeth in the opposite jaw when the mouth is closed. After the band has been fitted to conform accurately to the circumference of the tooth, the free end, which is to carry the gold cusps, can be contoured, or given such shape as may be necessary, without risk of altering the fit of the cervical portion, in the following manner: Soften a piece of dental lac and press the fitted cervical end of the band into it, then thoroughly chill the lac and with pliers give such contour to the band as is required to conform it to the shape best suited to fill the space, which is usually that of the natural crown it is to replace. The gold crown should rarely, if ever, be used farther forward than the second bicuspid, but should be confined to the molars where these are too short to admit of a sufficiently thick tube crown to withstand the bite.

The half band. The half band is preferred by many, and is of value in cases where extensive recession or decay occurs in the labial or buccal surfaces of the teeth. Where it would be difficult or even impossible to adapt a full band accurately, the half band will be found to meet all necessary requirements, but a band which embraces two-thirds of the circumference of the root is often preferable, as by its means greater stability and anchorage is obtained.

Although such a band does not encircle the whole of the root, it is advisable to trim it as for a full band, as much more may be ground off the root-face, thus allowing the tooth to be fitted farther under the gum. With regard to the method of procedure in making the half band, it would appear to most men that this is more easily and satisfactorily accomplished by first making a full band and proceeding to finish it up to and including the soldering of the post to the cap. This, however, is by no means necessary, and better results may be obtained both as regards fit and quickness of construction by adopting the following method: No measurements or model are required in this plan, but a strip of gold of the required thickness and of sufficient width should be bent to a U-shaped form and the outline of the gum margin marked, and the gold cut away to conform to it as previously described in the making of full bands. The

Fig. 86.

Fig. 87.

Fig. 86: Shows method of shaping gold for half band.

Fig. 87: Shows burnishing of cap, the band being held against the root by means of a piece of hard wood.

result will be, in normal cases, a band shaped as in Fig. 86. To this a pure gold cap may be soldered, after which the cap and band should be placed on the root and burnished until it accurately fits. While this is being done, the band should be held firmly against the lingual surface of the root by means of a piece of hard wood (Fig. 87), or the point of the forefinger of the left hand. During the process of burnishing, the labial edge of the root will be defined on the surface of the gold cap, as will also the entrance of the canal. The cap and band are then to be removed, and the excess of pure gold trimmed off. Before replacing the cap and band, the surface of the root may be further reduced below the level of the gum by means of an Ottolengui root-facer, or small stone, care being taken to avoid injuring the

gum. The post is next adapted in the usual way and soldered to the cap, which is then to be returned to the root. Before burnishing, the post should be shortened so that it will just clear the bite and no more. In the case of multi-rooted teeth where more than one post is employed, these are to be dealt with as already described. The cap is then to be finally burnished to place, when it is ready for the impression. Where it has been deemed desirable to employ a platinum base instead of a gold one with a view to attaching the tooth or crown, the methods already suggested may be employed, the only modification being that the cap, band, and post are to be united with pure gold or pure gold alloyed with from 5 to 30 per cent. of platinum.

Fig. 88.

Cap and tube. Silk through tube to keep lumen clear while soldering.

Tube posts instead of solid posts. Where circumstances call for the application of a tube post instead of a solid one, the method whereby it is attached to the cap differs but slightly from that followed with regard to the latter, and consists merely in filling the lumen of the tube with some material which will prevent the solder from reaching its interior. This may be done satisfactorily by pulling through the tube a few strands of silk or cotton, or a spill of soft wood dipped first in rouge or whiting (Fig. 88). This should be done after the cap and post have been adjusted in the mouth and before the model has been taken. With regard to any bending of the tube post which may be necessary in the process of adjustment, it is safer to fill the tube with some strands of thin copper or iron wire; thin binding wire does well to fill the tube before bending it, as otherwise a "kink" may be formed in the tube post. After bending, the copper wire can easily be withdrawn.

Taking the Impression, Bite, etc.

There are various methods whereby an accurate impression may be obtained, and the selection of the most suitable one will depend upon the nature of the case. Generally speaking, plaster will yield the best results, and it is indispensable in certain cases. At the same time dental lac or modeling compound fulfils all necessary requirements in most cases, and saves time. While a model is nearly always essential, a bite in many cases may be dispensed with, particularly in the case of the front teeth. Where, however, a bite is employed, as it usually should be where the grinding teeth are concerned, the model need only be cast with a heel and not on a bite-frame, as it is advisable to do the final shaping of the crown with regard to all its surfaces, including the occlusal (but exclusive of fitting it to the cap), before finally fixing the latter on the root. Where plaster is used for taking the impression a tray may be employed in the usual way, or a quantity of plaster may be placed on a piece of thin paper and the mass carried to place and held by the fingers until the plaster sets. In order to remove the impression with the least amount of damage when there are undercuts, it should be deliberately broken by placing the forefinger and thumb of one hand inside the mouth, and the forefinger and thumb of the other hand outside, and so pulling the impression apart, when it will usually break in two or three pieces. The cap-and-post may come away in one of these, but should it fail to do so it can easily be replaced in the impression. If, however, there be any difficulty, it can be removed by firmly grasping the end of the post with a pair of pliers, and applying a firm and steady force; without such precaution it may come away with a jerk and coming in contact with the adjacent teeth become damaged. When dental lac or modeling compound is used for taking a small impression

and bite at the same time, the following method will be found to answer well: Take a piece of either of these materials of suitable size, and after softening it press it into the space and around the adjoining teeth, when the patient should be instructed to close the jaw firmly till the teeth meet, and while the impression material is held against the buccal or labial surface, the tongue should be pressed against the mass in the mouth. Before attempting to remove the impression and bite thus obtained, it should be thoroughly chilled with cold water, either by syringing or by means of a small sponge, and when doing so the saliva ejector should be used, so that the water may be drawn off as quickly as it is applied. The most suitable plan, however, will depend upon the nature of the case. For instance, if the case is at all extensive, involving say the six upper front roots, it is better to take an impression which will include all of them, as well as two or more teeth on each side, and at the same time a separate impression of the lower jaw, as these when mounted together on a suitable articulator give better results. Before proceeding to cast the model a thin layer of wax should be run around the inside of the bands to facilitate their removal.

Having obtained the model and bite, the next step is to thicken up the cap (when it is made of pure gold) with 20-karat solder. In order to do this the cap and post should be carefully removed from the model. To enable this to be done without danger of altering the relation between the cap and the post, the model should be hollowed out from its under surface in a line with the post or posts of the tooth or teeth to be crowned, until the end of the post is exposed. The cap and band should then be heated to soften the wax, and then by means of a blunt instrument be pushed upward, bringing the cap with it, and so removed without risk of the danger spoken of. The cap and post should now be invested with the smallest possible amount of investment which will enable the parts to be held together during the thickening-up process. (Fig. 89.)

FIG. 89.

FIG. 90.

FIG. 91.

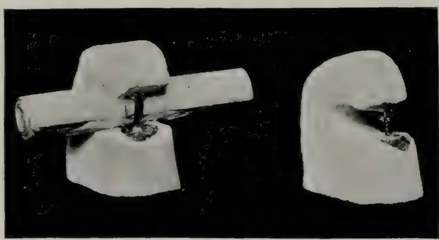


FIG. 89: Cap and post invested for soldering.

FIG. 90: Post to carry crown readjusted.

FIG. 91: Cap and post invested for soldering.

The thickening of the cap by means of solder may be quickly and satisfactorily carried out as follows: Borax the surface of the cap, and place on it three or four pieces of solder large enough to lie flat without overhanging. Heat up carefully in the usual way, so as to prevent the solder from jumping. After the borax has become fused, use the blowpipe with a large soft flame to heat the piece up, and flow the solder over the surface. When the soldering has been completed the piece may be plunged into cold water and the investment washed off. Next it should be boiled off in pickle to remove the borax. The cap should now be trimmed up with a fine file or stone in the engine, care being taken to remove any superfluous solder

which may have run up the post, and which would prevent the tooth from getting home without an undue amount of countersinking of the tube at the base of the crown—a matter of importance, especially where the crown is a fairly shallow one, as it is advisable not to weaken the porcelain more than is necessary.

If the tooth to be crowned is an incisor the one post will do for anchorage in the root and for supporting the tooth, and if its position has not been accurately determined before the impression has been taken, this may now be done by means of the post-bender or a pair of pliers, taking care to grasp the post close to the cap and to observe that the position of the cap is not altered. Such bending is almost invariably toward the lingual surface, and when considerable it results in unduly weakening the porcelain there, even although the post is brought to just behind the incisive edge of the tooth. A plan, however, whereby the maximum strength of porcelain may be obtained is to cut the post off close to the cap and readjust it more toward the labial surface (Fig. 90). If, on the other hand, the tooth is a bicuspid, it is to be dealt with as described in a previous chapter, care being taken to have the post when possible in the center of the cap; but in the case of a molar the procedure is as follows: Drill a hole through the thickened cap and insert the end of the post into it. In order to keep the post in position, fix with sticky-wax, and as it is necessary during the process of soldering that the post be held securely, do this by investing as shown in Fig. 91, where it will be seen that a small arch of the investment material is employed, and this is formed by using a small roll of paper, which should be withdrawn after the investment has set. This may be thought to require a good deal of time, but experience has shown that only four minutes is necessary for the investing and for the investment to harden, while two minutes is sufficient for heating up and soldering. After the soldering is completed, the excess of solder is to be trimmed off and the tooth fitted in the manner to be described.

(To be continued.)

METHOD OF CONSTRUCTING A PORCELAIN JACKET MOLAR CROWN.

By EDWARD B. DUCASSE, D.D.S., New Orleans, La.

A FERRULE is formed in platinum of 30 gage, and is contoured to conform to the general outlines of the tooth to be crowned. The interproximal spaces, the contact points, and the marginal ridge are attained in the band.

The next step consists in cutting out the buccal aspect to the free margin of the gum and to the disto-buccal angle of the second bicuspid and the mesio-buccal angle of the second molar. A platinum floor of 46 gage is then soldered to the band.

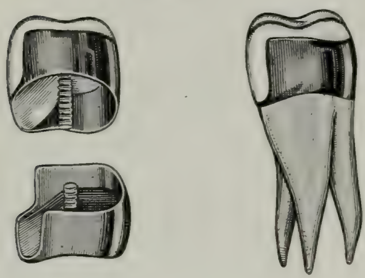
We now place this frame on the root, and, after burnishing the floor over the root, a dowel is placed in position, waxed, and invested. After soldering the dowel (which has been threaded) with platinum solder, the framework (see Fig. 1) is ready to receive the porcelain.

High-fusing porcelain is placed in the vault, and the vibration necessary in order to remove the moisture is obtained with the aid of an ordinary electric bell —the hammer of which plays on the hand-vise which holds the work, instead of on the bell, which has been re-

moved. The connection is made by a floor push-button. The use of this apparatus minimizes the work to a great extent, since the operator is able to absorb the moisture as fast as it appears.

Instead of using blotting paper as an absorbent, as is customary, a coarse powder of porcelain, prepared by crushing porcelain teeth, is sprinkled on the work. This higher-fusing porcelain takes up the moisture, and produces a denser body. When no more moisture appears, the case is ready for baking.

FIG. 1.



This method of controlling the moisture will cause a very small amount of contraction, which is indeed a very gratifying result, since the shrinkage of porcelain is a most perplexing feature to the worker.

The finished case (see Figs. 2 and 3) usually requires about two firings.

When we are to crown a molar which is bell-shaped, the ferrule alone will lack the proper contour lingually; to overcome this it is suggested to contour a piece of platinum plate, of about 27 gage, to the shape of the desired restoration, and to solder this to the ferrule.

If a large portion of the lingual aspect of the crown remains, the use of a dowel will not be absolutely necessary. In such a case a platinum pivot is soldered temporarily to the lingual surface of the band, which enables one to hold the mechanism in the hand-vise. A lug should be soldered to the floor for the

FIG. 2.

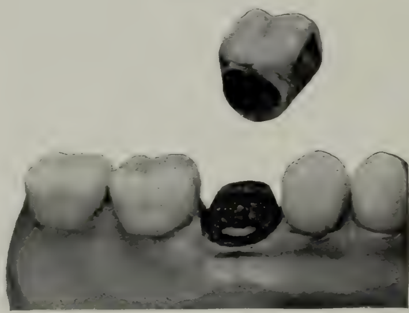


FIG. 3.

attachment of the porcelain. Upon completion of the firing of the porcelain, this pivot is cut off.

A crown so constructed will be strong enough to withstand the strain of mastication.

The lingual contour is not restored by fused porcelain, thereby giving more strength.

ESSENTIALS OF ANATOMICAL ARTICULATION.

By W. C. DALBEY, D.D.S., Du Quoin, Ill.

MUCH has been said and written upon the subject of anatomical articulation. Yet notwithstanding their theoretical enthusiasm for this subject, very few dentists, comparatively, are using anatomical methods in artificial plate-making. The writer attributes this lack of zeal among many members of the profession to the multiplicity of methods, and to the complexity of many of these methods. While one may be a firm believer in scientific methods, yet more science may be instilled into some subjects than is practical. A large assortment of instruments may be very scientific, but all of them may not be very practical. We are living in a swift age—too swift, in fact, for the average dentist to use a large number of instruments, which require a great deal of time and useless manipulation in artificial plate-making. The writer has all the latest articulating instruments, but has been discarding them one by one, until his armamentarium for the making of anatomically correct plates consists of but two or three; and he hopes to present a method that is not only practical but may be easily understood by the average dentist.

As has already been intimated, the more complicated methods may be quite suitable for obtaining certain desired results, but the prices paid for artificial dentures will preclude the general use of these fine instruments in the construction of dentures. While, as has been stated before, the writer is a firm believer in anatomical methods, and uses no other, he meets with practitioners who are always saying, "Raise your prices! Show your patients how much better these methods are." This advice the writer has followed. But the average practitioner is not using anatomical methods because of the multiplicity and complexity of methods suggested by different prosthetists. Some dentists say "I believe in anatomical articulation, but I don't know the best methods," or "I am looking for the best instruments before I begin." To these we reply, "Study the principles by actually practicing *some* method."

THE FUNCTIONS OF AN ANATOMIC ARTICULATOR.

The writer is simplifying his methods more and more, so that at present they are no longer complicated. In the first place, one must have an articulator that is capable of reproducing the essential movements of mastication. Moreover, it must reproduce them according to the lines of the masticatory movements of the patient for whom the work is being done. To illustrate: A miniature articulator may reproduce certain masticatory movements that are found in the human jaw, but to make a set of dentures upon this small articulator would be impractical. So, in artificial plate-making, all these movements must be reproduced to their full dimensions. For this reason the articulator must be adjustable to the exact sizes of the several points in the mandibular movements that enter into mastication. The size of the triangle of the human jaw, the position of its oscillating points, and the size and shape of the alveolar ridges, are the factors which determine the dimensions of these movements. There is more lateral movement in a mandible with a round arch than in one with a V-shaped arch.

Fig. 1 shows the writer's adjustable articulator, which is capable of repro-

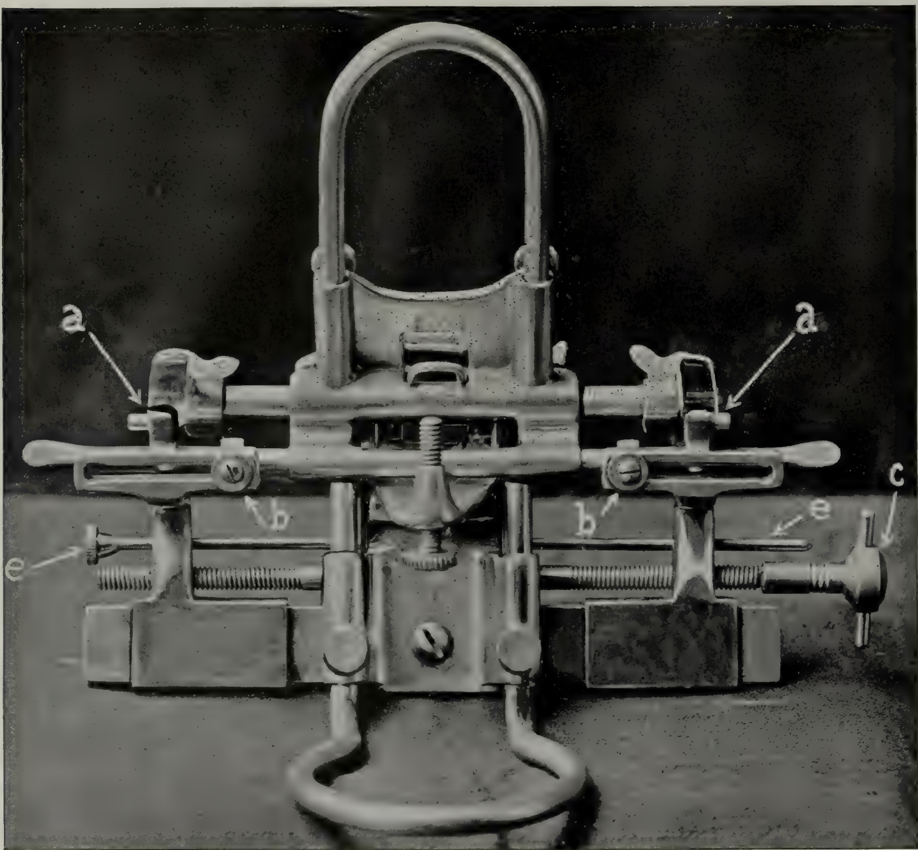
ducing all the masticatory movements of the human jaw to their exact and full size.

With this articulator the points of anatomical articulation are simple, and the steps are few. It is but reasonable to suppose that if we can reproduce upon the articulator the exact dimensions of the masticatory movements of the human jaw, the plates made upon such an articulator will coincide with the human articulator when the plates are placed in the mouth.

DETERMINATION OF THE BASE LINE.

To accomplish these results, the writer first takes the measurement of the base line of the mandibular triangle. This is done at the necks of the condyles just back of the lobes of the ears. When this is being done, the patient is requested to open the mouth a little. This throws the necks of the condyles forward and downward, away from the mastoid process, and gives more room for

Fig. 1.



measuring. The instrument for taking this measurement, which consists merely in thimble-pointed calipers, is seen in connection with Fig. 7. The measurement from center to center, at these points, of the necks of the condyles is the same as that from center to center of the condyles proper. This measurement becomes our base line, and is transferred to the articulator, which is ad-

justed to this measurement. The condyles, *a*, *a* of Fig. 1, are adjusted to this measurement by the manipulating key, *c*. a simple matter, and in the majority of cases is all that is necessary. While the triangle is not always an equilateral one,

Fig. 2.

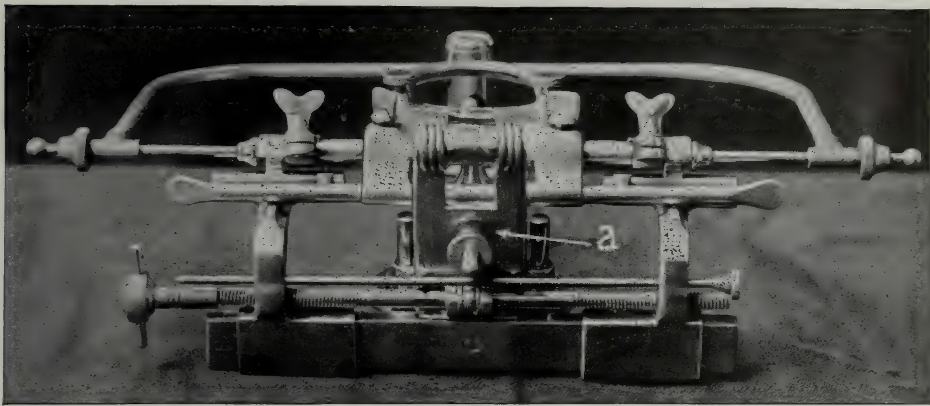
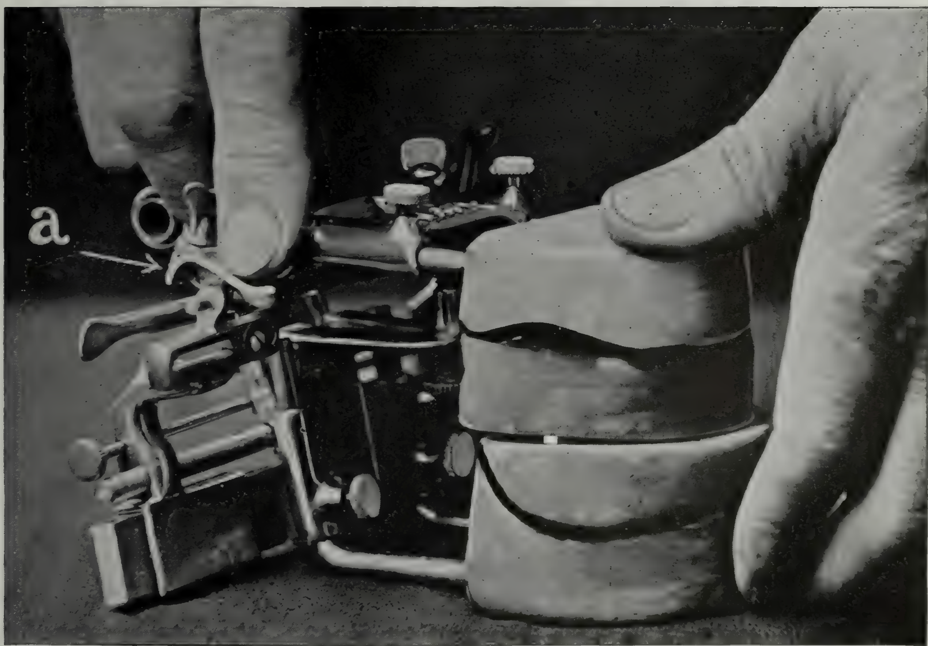


Fig. 3.



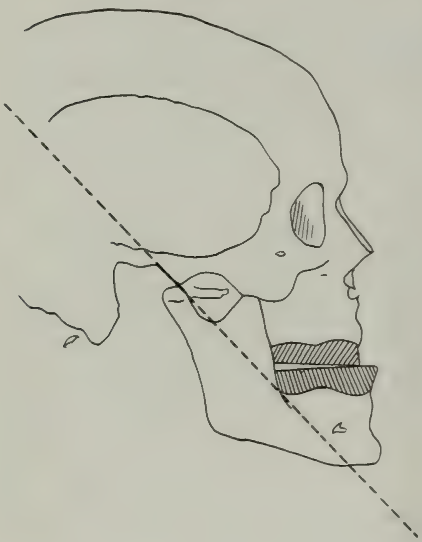
yet in the majority of cases it is so very nearly one that the results of the variations become practically *nil*. When mounting these according to the triangu-

MOUNTING THE MODELS.

This mounting of the plates in accordance with an equilateral triangle becomes

lar measurement of the patient, it must be observed that the occlusal planes of the trial plates are mounted so that the

FIG. 4.



line of the posterior end of the occlusal plane will extend to the rod, *e,* which is the posterior point of the occlusal plane upon the articulator. This brings the oscillating points, *b, b,* half way between the tops of the condyles and the occlusal plane. In most cases, for all practical purposes the oscillating points, *b, b,* need only to be adjusted to three-eighths of an inch inside of the condyles. This is especially true if the teeth have been recently extracted.

DETERMINING THE CONDYLE PATH RECORD.

The last step is to find the inclination of the condyle path. This may be done either with the protrusive bite or the open bite. With the protrusive bite, the well-known little bite-gages are used. The spring which holds the two main parts of the articulator together is loosened and thrown back. This spring is shown at *a* in Fig. 2. It allows the upper part of the articulator holding the artificial fossæ to be thrown upward and backward, or more properly speaking, the condyles to be thrown downward and forward. The artificial fossa, *a* in Fig.

FIG. 5.

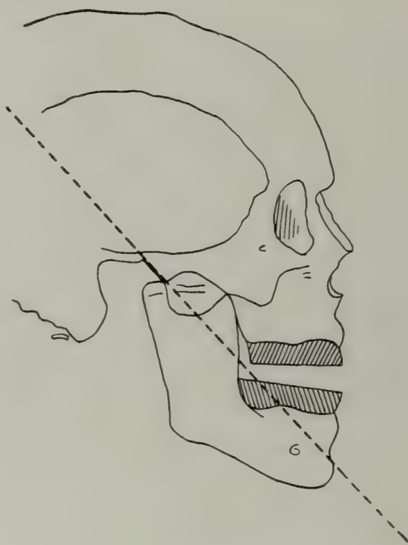


FIG. 6.

3, is then thrown downward upon the condyle and fastened with its thumb-screw.

THE OPEN BITE METHOD.

The open bite method is simpler and more accurate; no matter whether the jaw is protruded or the mouth opened, the condyle is thrown downward and forward in its fossa (see Figs. 4 and 5). Sometimes patients having flabby muscles about the jaw will make it difficult for the dentist to obtain accurate records by the protrusive method. With such patients the open method is ideal. Those same flabby muscles become hard and rigid, holding the condyles downward and forward in their fossæ. Fig. 6 shows the bite-gage in position; Fig. 7 the bite-gage separating the trial plates upon the articulator. The general shape of the open bite-gage is seen in Fig. 8. The differences in the notches upon the gage serve to insure accuracy in replacing them in their proper position. In using the open bite-gage it is not necessary to loosen the spring which holds the two main parts of the articulator together. Therefore, in this respect also, this method is much simpler. It will be seen that with either the protrusive bite or the open bite the artificial condyles assume the same position. All that is necessary is to press the artificial fossa down upon its condyle, and fasten it there with its thumbscrew.

FIG. 7.

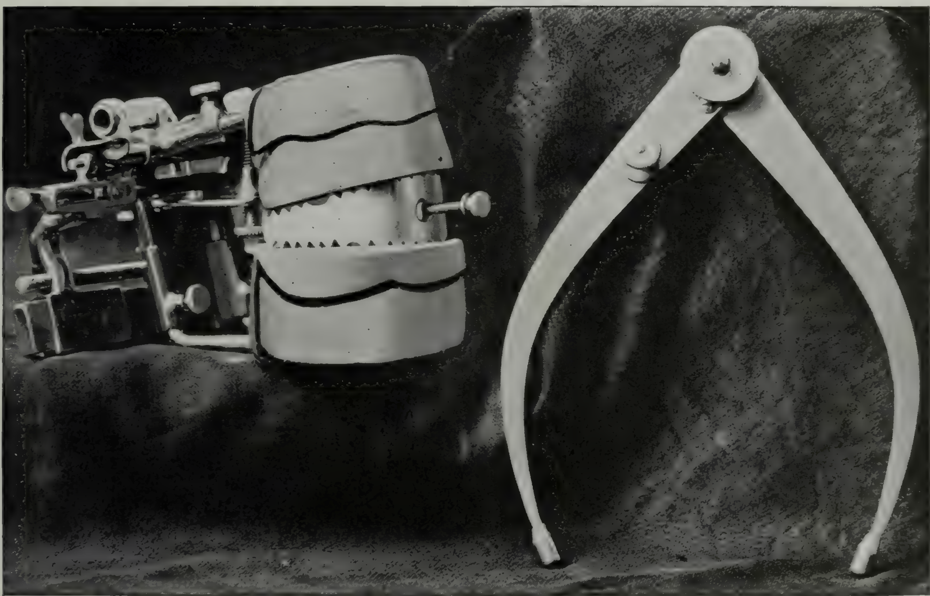
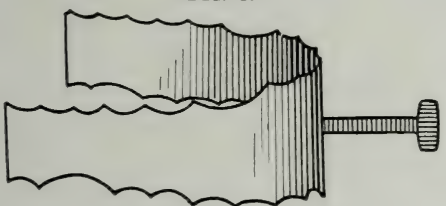


FIG. 8.



If, in mounting plates, the patient's features should cause one to fear that there is an abnormality in the triangle, that is, if it be suspected that the sides of the triangle vary materially, then with the pair of calipers used to obtain the mandibular base line, a measure is taken from each condyle to the median line of the base plates. If these side

lines vary materially, the plates are mounted according to the measurements obtained.

This method of mounting does away with the face bow, which is so difficult for many dentists to handle. If some special case, however, should require the use of the face bow, provision has been made for it in the articulator. (See Fig. 2.)

OBTAINING THE LATERAL PATH RECORD.

The last step to be taken into consideration in this system of anatomical work, should there be any abnormalities discovered in the lateral movements, is to obtain the records of the lateral movements of the patient's mandible. This can be done very easily by placing the trial plates in the mouth, having the patient move the mandible sidewise about three-sixteenths of an inch, with the trial plates closely together. With a sharp-pointed instrument the upper plate is marked along the line of the lower plate. This is also done on the opposite side. The trial plates are then returned to the models, which have been mounted upon the articulator; the oscillating points, *b, b* in Fig. 1, are then moved so that, when the plates upon the articulator are being moved laterally, the line which has been marked upon the occlusal surface of the upper trial plate registers with the side edges of the lower trial plate as recorded in the patient's mouth.

THE PROTOZOA OF THE MOUTH IN RELATION TO PYORRHEA ALVEOLARIS.

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FROM THE PATHOLOGICAL LABORATORY, SCHOOL OF MEDICINE, UNIVERSITY OF PENNSYLVANIA.

(Read before the Pennsylvania State Dental Society, at its annual meeting, Philadelphia, Pa., July 1, 1914.)

THE following is presented purely as a preliminary report of work undertaken and in course of prosecution by the writer in collaboration with Dr. Allen J. Smith, professor of pathology in the School of Medicine, University of Pennsylvania, the fuller statement of which will be published by both in association when the results are finally determined.

UNCERTAINTY IN REGARD TO THE ETIOLOGY AND TREATMENT OF PYORRHEA ALVEOLARIS.

It is well known with what persistent difficulties the dental profession has labored in connection with the condition usually spoken of as pyorrhea alveolaris; nor is there occasion here to go into details as to the various views which have been presented as to its etiology and the methods by which it is to be handled in treatment. Pyorrhea alveolaris has always been regarded as a form of bacterial infection in which local irritative conditions—such as the presence of tartar or the downward growth of the enamel organ in form of Hertwig's sheath—are thought to play at least a predisposing part, if no more, and in which systemic faults have very commonly but variously been looked upon as etiological

factors by different writers at different times. Thus the severe anemias, gout, diabetes, syphilis, and Bright's disease have all been accused as being of fundamental importance, either by their affecting the mechanism of immunity, by inducing local changes, faults of circulation, faults of nutrition, or local intoxications. Many types of vegetable micro-organisms, notably among them the pneumococcus and streptococcus pyogenes, have been encountered and isolated from the local lesions, and the importance generally attributed to these vegetable micro-organisms is evidenced in the invariable prominence of measures toward cleansing and antisepsis of the local lesions and of the oral surfaces generally, in practically every plan of treatment. While it can be fairly claimed that with persistence in such measures, temporary improvement and disappearance of the lesions are frequently obtained and occasionally a permanent cure is effected, it must be admitted that, in comparison with the decisive efforts of antiseptic surgery elsewhere in the body, the results have been disappointing, and that many cases are likely to continue indefinitely in spite of all known treatment along these lines, involving discomfort of the patient, loss of teeth, and probably more serious general impairment, and bringing disappointment to the most conscientious dentist. Even the efforts to destroy the bacterial infection by specific vaccines are, at best, neither conclusive nor even uniformly ameliorative.

PRESENCE OF PARASITE AMŒBÆ IN PYORRHEA.

From this standpoint and from a general interest in the fact that the studies of the protozoan parasitology of the mouth—a location appreciably suited to protozoa from the viewpoint of its conditions of moisture, temperature, provision of appropriate food material and openness to the chances of infestation—have been relatively infrequent and unsystematized, the present study was undertaken. It seemed entirely probable that not only forms of rhizopods, such as the amœbæ described by Kartulis and by Prowazek and others, in a comparatively limited number of cases, but possibly also flagellates and ciliates might be accommodated in this part of the body, and that those at least which are not mere surface habitants, but actually penetrate into the tissues, might in some of the inflammatory conditions of the mouth, particularly in the chronic ulcerative forms, in analogy with the chronic ulcerations due to dysenteric amœbæ, be of pathogenic importance.

Because of the better opportunities of control of the individuals under examination, and the frequent existence of dental affections among the class of individuals included, the investigations were at first limited to patients in the insane department of the Philadelphia Hospital, although later a number were referred to the writer by some of his colleagues. To Dr. J. Allen Jackson, physician in charge of the insane in the Philadelphia Hospital, and to the interested friends who have thus aided in furnishing material for study, the writer would here present his associate's and his own thanks.

MICROSCOPIC TECHNIQUE OF DETECTION.

To this date, forty-six cases of suppurative affection of the gums and pericemental tissue have been examined by us, in all of which, without a single exception, parasitic amœbæ have been discovered in active motility. The endamœba involved has not been finally identified; in fact, both Dr. Smith and the writer suspect that two different species have been encountered in the group of cases examined. They are best seen by taking a bit of the purulent contents of the pyorrhea pockets upon an appropriate instrument and diffusing this in a drop of slightly warmed normal saline solution, on a warmed slide, covered, and examined fresh and unstained. In the midst of the pus and red blood cells and myriads of bacteria and leptothrix threads, these protozoa may be readily made out with the microscope,

using the 4 mm. lens; and thus far but few of the cases have required extended observation before the organisms have been found. They are actively motile in such preparations for fifteen minutes or more at the temperature of the early summer months since this study has been in prosecution, but eventually become quiescent. They vary in size from small specimens of 6 or 8 micromillimeters in diameter to common examples of 30 or more micromillimeters in diameter. In movement, they project but a few pseudopods at one time, commonly but one or two, which extend in thick digitate to lobose form from the main body of the protozoon. The differentiation between clear ectosarc and distinctly and coarsely granular endosarc is well seen in the motile animals; the ectosarc forming the pseudopodia, in which the granular endosarc extends but slightly. Within the endosarc are numerous food vacuoles, especially seen in the larger examples, containing fragments of leucocytic chromatin and apparently portions of red blood cells. No contractile vacuole exists. When at rest, the organisms do not show well the differentiation between endosarc and ectosarc. The nucleus is invisible in the unstained specimens, is relatively small, measuring in the larger specimens less than 5 micromillimeters, is very poor in chromatin, and stains but faintly, showing a small and uncertain internal body, with but few or often no chromatin grains along the nuclear membrane. In staining with anilin dyes, it is often invisible, even iron hematoxylin giving but indifferent demonstrations. Encysted and dividing forms of the parasite have not been observed as yet.

PREVIOUSLY KNOWN FORMS OF ENDAMŒBÆ OF THE MOUTH.

Several forms of endamœbæ have been described as mouth inhabitants, one of which, *endamœba Kartulisi,* has been described as pathogenic, presumably giving rise to suppurative tumors of the jaw, in which they were originally met by Kartulis in Egypt (*Zeitschr. f. Hygiene,* vol. xiii, p. 9), and by several others since. The organism is described as larger than the endamœbæ observed by us, measuring from 30 to 38 micromillimeters in diameter, showing a clear difference between endosarc and ectosarc, characterized by long finger-like pseudopods, actively motile, with a small vesicular nucleus showing on staining a clearly seen nucleolus, and a perinuclear clear zone. The difference in size, length of pseudopods, and clearly stained nucleus render it probable that this organism is not identical with those observed by us, although in one case, in which the organisms were studied only in the fresh state, there was a closer approach to *endamœba Kartulisi* in the shape of the pseudopods and size of the parasites than is indicated in the above description of our organisms.

Endamœba buccalis of Prowazek (*Arbeit. aus dem Kaiserlich Gesundheitsamte,* 1904, vol. xxi. p. 42), which is probably the same as *endamœba buccalis* of Steinberg (*Zeitschr. f. Gegenwärtige Medizin,* 1862, Nos. 21 to 24), has been frequently observed in the mouth, but has not been looked upon as of any pathogenic importance, although most commonly described in material from carious teeth. This organism is described as ranging from 6 to 30 micromillimeters in diameter, as of lively motility, with a single, small, vesicular nucleus, from 1.5 to 4.5 micromillimeters in diameter, poor in chromatin, with a thick membrane, and an internal body containing chromatin grains and with grains of chromatin in the peripheral zone. The nucleus is described as clearly seen in the living animal unstained, and as staining conspicuously with dyes. This endamœba in its activity is described as thrusting out a few lobose pseudopods, and as showing a clear distinction between the endosarc and ectosarc, the latter showing in the resting stage as a clear refractile zone. The endosarc contains a number of food vacuoles, no contractile vacuole. It is believed to be identical, too, with an amœba described in 1879 by Grassi under the name of *amœba dentalis,* which, however, Grassi later stated to be not a protozoon, but a so-called "salivary

corpuscle," and also with *amœba gingivalis* of Gros (1849). Thus far we have not been able to consult the original articles of these writers, and must leave their relations undiscussed. Prowazek's *endamœba buccalis,* we suspect, includes the majority of examples observed by us, although certain points in the description differ notably, especially in the question of visibility of the unstained nucleus, its readiness of coloration, and the distinctness of the clear ectosarc in the resting stage. In size and shape of the endamœba, in the smallness and vesicular type of the nucleus, and in the activity of movement, the specimens examined correspond well with *endamœba buccalis.* Döflein, in discussing this latter organism, mentions its rather wide distribution in Europe, calls attention to its special occurrence in carious teeth, but states that it is a habitant rather of the surfaces of the mouth, and that it does not penetrate the tissues. While thus far we have found our organisms only in the contents of pyorrhea pockets, and have failed in some normal mouths to encounter them; and while, for another reason, to be given hereafter, the organisms seem distinctly pathogenic to us, it should be at once stated that these points of difference are by no means at this time of differential importance. Further study as to the question of the true distribution of the organisms in infested mouths, the possibility of their existence in presumably normal mouths, and in the way of more extended observations of the organisms in stages other than those above described, their mode of reproduction, the possibility of artificial cultivation, etc., is required before either of us can feel in position to present a final statement upon this subject. In this connection we propose to study more fully, material from well-kept mouths of children as well as of adults without appreciable lesions, the contents of carious cavities of teeth, the tissues of pyorrhea alveolaris in section, and in mouths known to be infested the position of endamœbæ in relation to normal teeth as well as those actually involved.

EXTENT OF CLINICAL FINDINGS.

As above stated, forty-six patients have been found by us to harbor, without a single exception, actively moving endamœbæ in the contents of pyorrhea pockets. In only one case were the parasites apparently absent on the first examination, but were found on second and more prolonged examination. Of the above number, three cases occurred in individuals whose mouths were at first supposed to be normal; but, on careful examination, pockets were found in which the endamœbæ were present. We are more than free to concur with Dr. A. D. Black, who stated (see DENTAL COSMOS, June 1912) that "ninety-five per cent. of persons who apply regularly for dental service have present in their mouths in some location conditions which constitute the principal etiological factors of peridental inflammation." We have examined for purposes of control ten mouths which, on preliminary causal examination, were regarded as normal. In seven of these, careful investigation failed to show any recognizable lesions, and in these seven cases prolonged microscopic examination failed to show any endamœbæ. On critical examination of these ten cases, however, a pyorrhea pocket was found in each of three individuals, and endamœbæ were encountered in the contents of these pockets. It is impossible, of course, from such limited data to declare that these endamœbæ never occur in mouths which are free from pyorrhea alveolaris, but in relation with the universal findings in the other forty-six cases, these seven controls without endamœbæ are at least significant, and in some measure corroborative.

EMETIN AS AN AMŒBICIDE.

While confident of the actual pathogenic importance of these parasites from their uniformity of occurrence and distribution, and from the evidence of their ingestion of leucocytes and erythrocytes, we did not feel justified in attempting

inoculation experiments, although these are contemplated in animals in future work. It was believed, however, that evidence might be obtained in the matter of pathogenicity of the organisms by having recourse to the use of emetin, which has been found practically a specific remedy against the endamœba of dysentery, within the past few years. This remedy was introduced by Col. Leonard Rogers of the Indian Medical Service, in Calcutta in 1912 (*Brit. Med. Journal,* June 22, 1912; *ibid.* Aug. 24, 1912; London *Lancet,* Oct. 19, 1912; *Therap. Gazette,* Dec. 15, 1912), based on work done by Vedder in Manila with emetin as an amœbicide *in vitro* (E. B. Vedder, *Bull. Manila Med. Soc.,* March 1911); and it is apparently a specific against the parasites in the dysenteric bowel, and even in a developing abscess of the liver. It is usually given hypodermically or intramuscularly in doses of from one-fourth to one grain of the hydrochlorid; but has been given by the rectum, also in keratin-coated pill by the mouth.

FAVORABLE RESULTS OF LOCAL APPLICATION OF EMETIN HYDROCHLORID IN PYORRHEA.

In using the drug in the cases thus far attempted in our series, thirteen in all to date, the drug has been applied locally, except in one instance, in a one-half per cent. solution of the hydrochlorid. At first a one per cent. solution was used, but seemed to produce a transient irritation of the gums, and was replaced subsequently by the weaker solution. The needle is forced down into the pockets, the point passing directly into the wall of the pocket, and as it is withdrawn, each pocket is left filled with the solution. In several of these thirteen cases the pus disappeared completely to gross inspection in twenty-four hours after application; in all, after three daily local treatments, this result was attained, and in all cases which have thus far been treated, after the second or third injection the general tissue took on a more and more healthy appearance, the teeth felt firmer, and the gums about them became tighter or harder. In all of these cases, after the second or third treatment, endamœbæ have not been found, as far as our examinations have proceeded.

CASE HISTORIES.

It is not within the requirements of this preliminary report to detail each of the cases, but the following notes of three may be offered as examples, which are practically duplicated by each of the rest:

Case I. Mr. R., age thirty-two, presented June 5, 1914. There were pockets about practically all of his teeth, in which endamœbæ were found readily. On June 9th the teeth were scaled, and on June 10th a one per cent. solution of emetin hydrochlorid was forced into the pockets with a hypodermic syringe, the point of the needle passing directly through the tissue, and each pocket being left filled as the needle was withdrawn. On June 11th, no pus was found in any of the pockets, and no endamœbæ could be found in the scant scrapings from the pockets. On June 12th, another treatment was given as above; marked improvement in the condition was noted, the patient volunteering the statement that "the gums felt firmer." On the following day, a third treatment was given, the gums then appearing normal. On June 16th, although the same normal appearance prevailed, the patient requested a further treatment, which was given him. On examination of the mouth on June 18th, the same condition was found, the patient stating, "My gums are feeling fine." On June 27th, when last seen, the gums seemed in perfectly normal and healthy condition.

Case II. Miss V., age thirty-five, exhibited pyorrhea pockets confined to the right and left upper and lower molars. On June 8, 1914, endamœbæ and certain flagellates were noted in the contents of the pockets. The treatment was as in the previous case, except in the use of one-half of one per cent. solution on June 15th and June 17th, at the latter date a slight improvement being evident. On June 19th, a third treatment was given, the patient volunteering the statement immediately on entering the office that her teeth felt very tight around the edge of the gums. After absence of a week from the city, the patient returned, with the pyorrhea apparently completely cleared up, ex-

cept for a slight redness about an upper left bicuspid, which had not been previously affected. No endamœbæ could be found about this inflamed area.

Case III. Mrs. A., age fifty-eight, on June 15, 1914, presented a long-standing case of pyorrhea, with many of her teeth lost from the affection. Endamœbæ were found on microscopic examination of the contents of the pockets. The patient was treated at once with emetin, one-half of one per cent. solution. The next day a second treatment was given, there having been marked improvement in the previous twenty-four hours. On June 18th further marked improvement was noted; a third treatment was made, a slight amount of suppuration persisting about an upper left central incisor. The patient remarked that her gums felt quite firm. On June 20th the gums were in fairly normal condition; a fourth treatment was given. On June 23d, a fifth treatment was given; the gums were firm, and all soreness had disappeared. When the patient was last seen on June 26th the same practically normal condition persisted, but an additional treatment was made.

PROSPECTS OF PRESENT INVESTIGATION.

In all the other cases the same prompt relief, and in those with five or six treatments an apparent cure, has been attained. Whether the cessation of the lesions is destined to be permanent cannot of course at present be stated, but in the experience of the writer, no other method of dealing with these peridental suppurations has shown any comparable influence, and there seems to be little reason to believe anything else than that emetin—here an amœbicide, as it is in ulcerative amœbic dysentery, where permanent healing has been regularly the result—will likewise in these cases prove a real curative agent.

In the meantime, we feel that the resultant improvement, with its banishment of pus and the endamœbæ, the shrinkage of the gums, the acquirement of firmness of the affected teeth, all speak for the fact that these organisms, which we have failed to find in seven normal mouths, and which we have invariably found in the pyorrhea pockets of forty-six other individuals, do possess a real pathogenic influence. Whether they are the sole pathogenic agents or whether, following the arguments of some investigators as to the endamœbæ of dysentery, they act also as the conveyers of bacteria of importance into the pericemental area, is another question; nor can it now be stated that all cases of pyorrhea are amœbic. Much further study must be applied before a full report can be offered. Granted that emetin is an efficient remedial agent, its value, when given as in dysentery, hypodermatically or otherwise, must be further tested in pyorrhea alveolaris; and finally, we feel that, in any further communication reference should be made to other protozoa—at least to one flagellate, and probably a ciliate—which we have noted from time to time.

THE RELATION OF THE INTERNAL SECRETORY ORGANS TO MALOCCLUSION, FACIAL DEFORMITY, AND DENTAL DISEASE.

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(Read before the Academy of Stomatology, Philadelphia, Pa., May 26, 1914.)

IN presenting this paper the writer desires first to admit his limitations and to make an explanation, if not an apology; for so much has been claimed which cannot be substantiated on the question of the ductless glands and their presumed functions that real physiologists are apt to look askance at the man who mentions their relation to any etiology, and his reputation as a therapeutist is at stake if he even suggests organotherapy.

Much of this distrust is well founded in the past experience of those who have been misled by the wildest flights of the so-called but spurious "scientific imagination." "Real scientific imagery," says a recent review, (1) "whether we call it by that name or designate it as a tentative hypothesis or a working plan, is the incentive that spurs to the highest scientific effort." Prof. D. Fraser Harris (2) of Dalhousie University, has brought together in print some instances in which an idea, first represented by a metaphorical expression, has in time become clothed into reality: Oxygen was merely a principle to Lavoisier in 1777, and when a century later it was produced in liquefied form, "the metaphor had become an actuality." In physiologic chemistry, the synthesis of the active principle of the suprarenal glands represents "the crystallization of a notion; the thing of the mind has become the thing of the laboratory; the thought has been captured and bottled." "Thus it is sometimes given to the man of science," again says Harris, "to touch, to taste, to handle what was once only a notion, a suggestion, a forecast, either in his own day or that of a less fortunate predecessor." "The fabric of medical progress, indeed, of all progress, is woven from legitimate dreams to a greater extent than the practical man is wont to realize or willing to admit."

In the light of this pronouncement, in spite of the fact that we have been at times awed and hushed by the statement that the dentist had better stick to the filling of the teeth as the shoemaker was one time told to stick to his last, we still believe that any science is our science if it be ever so remotely involved in our work, and an effort will be made to assemble certain of these facts from widely variant sources into a working hypothesis. Not one item is here submitted but what has been proved by at least three investigators, either in the laboratory, or the clinic, or by organotherapy; even so, there remain sad gaps in this, as in every new theory, which have to be bridged by probabilities—all of which will be noted. There will be much error, no doubt, but if one little strand of truth can be made to correlate into a real etiology, where hitherto, in these conditions, we have been doubtful, it will be beyond the hopes of the writer.

We will attempt to show—

(1) That at least three of the internal secretory organs are necessary to the maintenance of life, and nearly all of them preside, each in its own way, over bodily growth, nutrition, and metabolism of proteids, sugars, starches, and fats; that they are of particular interest to us in relation to the connective tissue

group, from mucoid tissue to bone and dentin, including the epithelial product enamel; they control alkaline storehouses in the bones, including waste and repair of the same, particularly of calcium and sodium salts; that there is an intimate connection between these organs and the sympathetic nervous system, in all its nutritive processes. As Starling(3) has explained, this means of tissue communication through a chemical, or hormone, discharged into the blood-stream, was the primitive method before the formation of a nervous system, and it is the only method now in the lower life forms, but greater specialization called into being first the sympathetic, and later the central nervous system, for more rapid communication; nevertheless this primitive form of chemical stimuli has been retained in its interrelation with all the group and in partial control of the great nervous systems.

(2) That all of these tissues and glands are co-operative with or compensate and inhibit each other in cycle; any interfering influence or disease which disturbs this co-ordination seriously and very diversely affects nutrition, bodily development, and function according to the time at which it occurs, before or after puberty, with the most marked effect at the periods of bodily stress and change—*i.e.* from birth to tooth eruption; the first and second dentitions; puberty and menstruation; pregnancy and lactation in the female; the climacteric and senility in both sexes; that the internal secretory organs have each a special function in these important periods besides that of growth, presiding over parturition, controlling sex and sex characteristics, promoting lactation, and maintaining immunity to infectious diseases in the infant; and all of this cycle is peculiarly susceptible to damage from the infectious diseases of childhood, as scarlet fever, measles, chickenpox, whooping-cough, etc.

(3) That normal development of the bones of the face and the base of the skull, the proper growth and articulation of these with the base of the skull, the growth of the nasal and postnasal regions and accessory sinuses and the eruption of the teeth all depend upon the correct functioning of these organs and their correlation with the sympathetic nervous system; insufficiency or disease in any one will interfere with the synchronism of the whole, causing various forms of deformity—as in major expression, for instance, thyroid disease producing cretinism, and myxedema and pituitary disease producing acromegaly and giantism, all affecting facial regions; as in minor expression, glandular insufficiency producing the different forms of malocclusion and defects in the teeth and their eruption. That the stress of dentition, both deciduous and permanent, together with all of the attendant serious reflex neuroses, is produced by such glandular insufficiency and trophic disturbance, interfering with the necessary synchronism of bony development. That tooth formation and the development of the dental follicle after birth, possibly before; the enamel organ and dentinal germ and their fixed products—enamel and dentin; also the other dental tissues which may be repaired—dental pulp, cementum, peridental membrane, and alveolar walls—are controlled by this cycle, defective functioning of which is illustrated in a highly cancellous alveolus, in enamel hypoplasias and opaque spots, in microscopic defects in enamel rods, which often symmetrically occur in all four of a group of teeth, the first molar for instance; the being subject to early caries, which Waller(7) mentions, interglobular dentinal areas, etc. That at least a part of the etiology of dental caries may be explained by the function of these glands in sugar metabolism, as shown by Kirk(4), and that many other obscure conditions of the mouth and saliva—witness the unexplained relation of pancreas to salivary glands—all associated with the wasting of the tooth surfaces, may be accounted for by defective calcium and sodium metabolism and excessive waste of body salts, all in a way under this glandular control.

(3) That there is an increasing percentage of malocclusion observed in both dentures, particularly the deciduous; the

premaxillæ and the maxilla frequently fail to develop downward and forward normally; the palatal processes of the maxilla do not develop antero-laterally to the norm, with the result that the first maxillary molars, instead of always being in correct position as claimed, are nearly always in lingual relation, according to Bonwill's rule. And who can say just what normal occlusion is, in the deciduous denture, as related to facial angles? That this narrow and too distal eruption of teeth locks the whole occlusion and face, particularly if the mandible pass mesially, as in class 3, in distal relation, preventing the downward and forward growth of the accessory sinuses; possibly preventing pneumatization and drainage of these sinuses: that early glandular insufficiency may affect the development of the base of the skull and the sella turcica, disturbing pituitary function; that defective premaxillary development often deflects the nasal septum, and all of these produce dental impaction and the stress of dentition.

(4) That hypertrophy of the pharyngeal and faucial tonsils is common to so many children with normal deciduous arches as to constitute it primarily not the cause, though after it persists it may be, of malocclusion and defective facial development; rather is it coincident with both, and is, we believe, produced by the same defective internal secretory influences in their control or lack of it over the thymus and lymphoid tissue which caused the malocclusion; that the percentage of children suffering from malocclusion, adenoids, and hypertrophic faucial tonsils is identical, and that hypertrophied tonsils are not necessarily infected, the latter condition being secondary, due to hyperplastic conditions.

(5) That the part played by the gradual evolution in maldevelopment of the face caused by a lack of use and by civilized food habits is recognized, but we hope to show that the most important time for study of defects in facial and postnasal growth is the period from birth until the eruption of the deciduous teeth, when use, save that of function by heredity, could have no effect; that the neglect of breast-feeding, when correctly augmented later by cow's milk and solids, is an important factor; that exclusive bottle-feeding deprives the child of certain activators, common to healthy mother's milk, which are intended to start the entire internal secretory system to early function—of which growth of bones and teeth is a part—at a time when they are needed most. The internal secretory organs of bottle-fed babies, on the contrary, have to await this process of growth, and they arrive finally to function, too late—after mischief is done by delay in this early period. And it can be shown with certain exceptions, such as rhachitis, the etiology of which is not clear, that herein lies the cause of the failure to develop or of development in the wrong direction of the face, teeth, and sinuses, and the coincident enlargement of pharyngeal tonsils; for the percentages of children with adenoids, enlarged faucial tonsils, and malocclusion are the same as for bottle-feeding or defective breast-feeding, and bottle-feeding has long been clinically associated with these deformities.

(6) That organotherapy, when intelligently and conservatively exhibited, is said to have done much to correct these facial defects in cretinism and infantile myxedema, without the help of the orthodontist; its use by the co-operation of the specialist of internal medicine, supplemented by calcium and phosphorus feeding, is suggested in a selected number of cases for study while the orthodontist applies mechanical measures. That enough data on the rapid widening of the maxillary arch is in hand, no matter what the method, nor what the discussion of effect on the palate, sinuses, or sella turcica, to prove that there has been rapid nutritional improvement of the child out of all proportion to the effects we might expect from sinus pneumatization and drainage; these cases must be studied in connection with all specialists interested, as they suggest stimulation of the pituitary and neighborhood tissues to growth and function. Finally, that while bone

growth is assisted by modern orthodontic methods and by correct relation and use, it frequently is not maintained, nor are the teeth permanently retained, without proper function of the internal secretory organs presiding over bone growth and calcium metabolism, and this may explain the failure of good retention and the necessary repetition of orthodontic procedure, which no doubt might be avoided by intelligent supplemental organotherapy.

(7) That all statements relative to the internal secretory organs are to be accepted with the greatest caution, a Scotch verdict being much safer than blind acquiescence, particularly as applied to our work, and so great are the dangers of organotherapy that no dentist should attempt it without the internist to watch all body symptoms. On the other hand, all observations on mouth conditions reported by physiologists as improved by organotherapy must first be confirmed by orthodontists and dentists who are more familiar with normal occlusion, for many such cases, as class 2, have returned to what only appeared to be normal by such simple expedients as the adenoid operation, etc. That the part which variation and heredity play in the formation and eruption of the teeth and growth of the face must never for a moment be forgotten in the study of these conditions; one of the principal objects of this paper is to emphasize the pathological as compared to what might be called normal variation, produced by deficient internal secretion, and to suggest to you Hasting Gilford's(31) theory that insufficiency of this whole internal secretory cycle may also be inherited, and run through a family or race, leaving its facial imprint.

Recognizing the defects in any attempt at classification for study of the internal secretory organs, they may for our purpose be divided into two groups—the *major,* because of its vital importance, consisting of the thyroids and parathyroids, the pituitary body, and the thymus; the *minor,* made up of the suprarenals and the chromaffine system, as associated with the great sympathetic and trophic processes; the sexual glands, testes in the male, and corpus luteum of the ovary and mammary glands in the female; all of which, whatever their other secretory function, furnish an internal secretion or hormone; finally the pharyngeal and faucial tonsils, not secretory organs, but involved in this consideration as a part of the post-pharyngeal lymphoid area, closely concerned with phagocytosis and clearly related in the lymphoid cycle to the thymus. These tissues are so often changed normally, in all the periods mentioned, that histologists disagree as to just what the normal really is, and the statements proceeding from animal experiment, clinical experience, and organotherapy are equally contradictory; however an attempt will be made to condense these findings, in the time permitted.

THE THYROID.

Osborne(5) says:

> The physiologic activities which the normal thyroid is expected to furnish may be summed up as follows: It is a necessary stimulant to growth in childhood, both bodily and mentally; it takes an active part in the deposition and distribution of fat and in nitrogen metabolism; it is an active opponent of nitrogen poisoning; without its activity, proper genital development is impossible and the secretions of the genital organs are imperfect. It takes an active part in the function of menstruation and in development of the fetus in pregnancy; during such periods it furnishes an extra amount of secretion. If it does not do so, the menstrual function is imperfect, the woman during pregnancy is abnormal, and parturition is likely to develop eclampsia and the child be born a cretin.

Cretinism is a mark of thyroid insufficiency in the child, as is myxedema in the adult; goiter and Graves' disease indicate hypersecretion of the gland, as does cachexia strumipriva, and the gland finally becomes exhausted and insufficient in these conditions, so the goitrous mother frequently produces a cretinous child. All authorities agree that in the cretin early bone growth is delayed, there is premature cessation of development of

the base of the skull and of the root of the nose, which is broad and flattened; the lips are coarse, tongue enlarged, skin yellow and leathery, and hair is scanty. Biedl[6] emphasizes the fact that puberty is retarded, endochondral ossification is incomplete, many epiphyses unclosed, and Schoneman[10] furnishes ample radiographic proof of degeneration of the hypophysis cerebri in cretins. "The cretin of twenty-five years of age is stunted, pot-bellied, and ugly, with the intelligence of a child of four or five years."[3] Waller[7] emphasizes the fact that there may be many phases of these facial defects leading up to actual cretinism; a partial cretinism without the mental deficiency, due to a small thyroid insufficiency in the child, just as there may be phases of childhood myxedema, and Biedl[6] is especially interesting when he sums up the whole matter thus: "The clinical picture presented by thyroidless children is very suggestive of that of cretinism." We would especially accent the similarity of the facial defects of real cretinism to the worst cases presenting for orthodontic treatment, and that these defective arches (particularly maxillary, as in class 2), malocclusion, generally associated with enlarged tongue, and adenoids, have all been corrected, according to many authorities, by feeding the child thyroid extract. This is a practice needing immediate and most careful investigation. We would emphasize the statement made by Ott[8]—in which all authorities again concur—that "A proper amount of thyroid secretion is of especial importance in the early intra-uterine life"—one of the periods named in the synopsis, when so many developmental processes are happening to teeth, sinuses, and face, many of which, if they go wrong, cannot be repaired, such as enamel defects and hypoplasias.

It is equally important that we thoroughly understand the assertion frequently made, that "Suppression of the thyroid is followed by a decreased irritability of the sympathetic nerve, and this is manifested in sluggish circulation and in certain trophic disturbances"[6]—because trophic processes are those involved, so far as we know, in bone absorption and rebuilding, tooth eruption and formation, and possibly in accessory sinus formation. If these processes are not normally timed, there is "stress of dentition"[20] caused by delay and impaction, frequently resulting in malocclusion, which in turn aggravates these neuroses of faulty dentition. "This gland has some control, not yet clearly understood, over the central nervous system and the blood and its products"[5]; but most important to us as dentists is its relation to the nutrition of the great connective tissue group, both in the child and the adult, illustrated in myxedema, "which occurs in women to the total of 80 per cent., and may be readily passed on to the child."[6]

Myxedema is the adult expression of hypothyroidism, producing atrophy of the genitals, ovaries, and testes; blunting mental activity; slowing speech and cerebration; reducing proteid metabolism and the amounts of phosphoric acid and carbonic acid excreted; producing hyperplasia of the connective tissues, which Starling[3] and others describe as "real interstitial growth of these tissues, enlarging the face and tongue"; and this may also exist, in a minor degree, during childhood and adolescence, and is also claimed to be relieved by thyroid feeding. It is very suggestive that this hyperplastic bone condition can occur in children, and it may account for enlargements and protrusive development, and "the failure to contract and turn downward, of the premaxillæ," as shown in the study of these bones by Mosher[18], which after the defect occurs become ossified into various phases of class 2; if true, it will indeed explain much hyperdevelopment of these areas.

Hyperthyroidism produces goiter in endemic and other forms, including Graves' disease, and is the exact obverse of myxedema and cretinism; over-function often leads to the compensatory enlargement of the gland and frequently thyroid insufficiency in both mother and child. So endemic cretinism, in children and animals, depending apparently on

drinking water, is quite common in goitrous districts. one of which "in France in 1873 totalled 120,000."(6) Biedl's remarks, that thyroid insufficiency does not present cretinous or myxedematous symptoms in the child at birth, but that they develop later because "The mother's organism sufficiently supplies the fetus with thyroid" for the early extra-uterine period, are interesting when read in the light of the statement, by many physiologists, that "The thyroid presides over lactation, supplying its secretion through mother's milk to the child,"(6) and to prove this he quotes Spolvarine's(9) studies of myxedema in several sucklings nursed by strumous or hypothyretic mothers or nurses, "whose milk," as he remarks, "did not contain the thyroid substance in sufficient quantity to activate the child's internal secretory organs."

THE PARATHYROID BODIES.

Always two or more are associated with the thyroid, the loss of all of which produces death, usually by tetany, and are particularly active in calcium metabolism. Erdheim has produced resorption and softening of bone, dentin, and enamel in rats by partial parathyroid removal; it is to be noted that these were rodents, with persistent pulps and enamel organs, where such resorption is histologically possible by way of the blood stream, and it is to be regretted that there is no record of such experiments on the teeth of mammals without the persistent pulp; a study of the salivary changes would be also instructive in this connection. "Tetany can ensue in lactation, in rickets, and in pregnancy. There is a juvenile tetany and a tetany due to gastro-intestinal diseases."(8) Howland says, "Those who believe that lesions of the parathyroids are the cause of all cases of tetany point to the abnormal teeth often seen with it as a proof of their contention, but tetany seldom occurs without rickets, and it is hard to tell whether it is the tetany or the rickets which affects the teeth." The defects affecting the teeth, according to the age at which the attack occurs, clinically associated with tetany are summed up by Fleishman as follows: "The dentin toward the root of the tooth is quite free from lime; enamel hypoplasias, in goblet or basin-shaped cavities or in circumferential rows, mark not only one but all of a group calcifying at the same period;" and he stoutly maintains that these conditions, which were formerly blamed on rickets, are produced during tetany, and hence due to the parathyroids. Tetany has been relieved by calcium feeding and parathyroid implantation; MacCallum(11) sums up this obscure matter by a saying, "It is certain that they (the parathyroids) exercise a peculiar and very important function in preventing the appearance of an extraordinary change in the circulating fluids, which produces extreme hyperexcitability of the whole nervous system." There is much evidence that it produces, or even consists in, a disturbance in the metabolism of calcium, and that the parathyroids control this." One physiologic fact stands out to the dentist, that in the thyro-parathyroid glands we have two organs which by internal secretion have to do at the same time with metabolism of calcium and the nervous system, the connective tissues, and enamel, which they help to form, and that when disturbed they can produce overgrowth or undergrowth of these tissues by way of the blood stream.

THE PITUITARY BODY.

Consisting of the pars anterior, pars posterior, and pars intermediate, the pituitary body when absolutely extirpated produces death, and it functions differently for each part. Out of the mass of contradictory evidence we quote Cushing(12) to the effect that "The pars anterior, so far as we can tell, presides more intimately over skeletal growth; whereas the posterior lobe has been shown to be more closely allied to the processes of tissue metabolism; an insufficiency causing a marked deposition of fat . . . .; and to the activity of the renal and vascular systems." As

this gland has to do with growth and sex characteristics, it is in close touch with the sexual glands and is always enlarged by pregnancy, castration, etc., hence lesions affecting it produce symptoms according to the period when they occur, before or after puberty, or when the skeletal growth is complete. Approximately, it may be said that hyperpituitarism, with hyperplasia of the anterior lobe, before puberty and depending on epiphyseal ossification, produces giantism, and after puberty it produces acromegaly; while this is a discussed point, Cushing(12) says, "Acromegaly cannot precede giantism, but may be grafted on it," therefore it is incorrect to associate acromegaly with childhood. In giantism, before puberty, there is excessive growth of the long bones with marked exostosis and persistence of the epiphyses, hypoplastic sexual conditions, impotence in men and cessation of the menstrual period in women. In acromegaly, after puberty, enlargement occurs in bones already complete, mandible and maxilla, with spacing between the anterior teeth, which tip outward, enlargement of the hands and feet, nose, larynx, tongue, lips, and including the antral and frontal sinus. Biedl(6) says, "Investigations of the histology of the bones shows that these results are due to deposition and resorption of bony substance, as in normal growth."

Hypopituitarism, where many symptoms are common to the hyper type, is marked by stunted skeletal growth, forms of dwarfism and ateleiosis; genital hypoplasia and infantile sex characteristics, with great deposits of fat. Cushing(12) mentions nasal prominence in this condition, due to sphenoidal distortion, as contrasted with mandibular enlargement in acromegaly; there is a particularly high sugar tolerance and a preference for large amounts of sugar and carbohydrate food; sugar, as such, appears in the blood, and it is notable that Cushing and others insist that other ductless glands enter into the sugar question, as the thyroids, parathyroids, and adrenals. This is all most interesting as bearing on the question of the etiology of dental caries; a carbohydrate dietary and high sugar tolerance being associated by Kirk not only with excessive caries and sugar excreted into the saliva, but with the many periods of stress previously named, when the pituitary is disturbed.

It is said that both of these conditions are the result of tumors in or near the pituitary producing pressure, illustrated by the neighborhood symptoms, as on the optic nerves, causing hemianopsia, and the gland may hypo- or hyper-function, finally ending in insufficiency. The significance of all of the foregoing to the dentist is that he should differentiate acromegaly from mandibular protrusion from other causes, and be able to recognize the tilting forward of the anterior teeth and increase in interdental spaces; and the orthodontist should bear in mind, no matter what his theory, from the numerous cases showing improvement in the pituitary syndrome, that it may yet be possible to relieve some of these symptoms by spreading the arches, possibly by drainage of the sphenoidal sinus, relief of lymph-blocking, or of the circulation—the forces acting in some way not known; but he should never speak of relieving pressure in the basilo-sphenoid and of allowing the hypophysis to sink from sellar decompression by widening the arch, for that is impossible mechanically and anatomically, and "The base of the skull is an entity."

THE THYMUS BODY.

The thymus increases in size from the embryo up to the second year, after which it functions and gradually involutes at puberty; it occasionally persists when this cycle is defective, particularly after castration or in early hyposexual states. That it presides over bone growth is shown by the fact that(8) "the femur of a thymected dog only contained one-half as much of the tricalcic salts as the control, and the bones could be cut with scissors;" when the thymus is insufficient, "artificially produced fractures unite only by connective tissues." Ott says(8)—"The alkali depot in the bones acts as an antacid depot. The

thymus is perhaps in the young animal the chief organ for the synthesis of nuclein; its removal would leave the nucleinic and phosphoric acid to cause acidosis; these acids dissolve the calcium salts or hold them in solution. Thymus extirpation causes in animals rhachitis, osteomalacia, and osteoporosis." The thymus is a lymph gland, and the hyperthymic state is known as the status thymo-lymphaticus, always fatal to children; there also may be many smaller phases of this generally hyperplastic lymph condition, described by Paltauf. It is therefore of interest to us in this consideration, for hypertrophic states of the pharyngeal and faucial tonsils and all the post-pharyngeal regions have been associated with the hyperthymic state in minor phase, and as many unite in thinking that the thyroid controls the thymus, and that it, together with the spleen, finally takes up the thymus function, an athyrosis in the infant would permit of overgrowth of all the post-pharyngeal lymph areas, possibly producing adenoids.

SUPRARENAL BODIES AND THE CHROMAFFINE SYSTEM.

Cavarzani([29]) claims that deficient function in the adrenals interferes with normal skeletal growth, and reports forty-seven cases of osteomalacia cured by epinephrin administration, so no study of this subject is complete which overlooks the extremely important relation of the suprarenal bodies and the chromaffine system to the great sympathetic nervous system, which has so much to do in a trophic way with the development of head and face. Chromaffine tissue exists alike in the sympathetic ganglia and the medulla of the adrenals; Starling says([3])—"A list of the actions of adrenalin, the active principle of the suprarenals, is identical with a list of the chief functions of the sympathetic nervous system," and Biedl([6]) agrees that "Adrenalin is the hormone by which irritability of the sympathetic is regulated." Some of the functions of the sympathetic are heart, muscle, and vascular tone and control of blood pressure; it also regulates the amount of sugar in the blood and glandular secretion, as that of the saliva. We must remember it is these trophic processes, more or less blood to the part, which constitute the only acceptable theory given thus far on the obscure question of tooth eruption, the root and alveolar absorption that permits it, and the physiologic repair which builds anew the alveolus. There is also a demonstrated relation of the chromaffine tissue in the adrenals and sympathetic to the same tissue existing in the islands of Langerhans (Cohnheim), in the pancreas, controlling sugar metabolism, and involved in the etiology of diabetes. And, as there is some unknown relation of the salivary glands to the pancreas, like the association of the parotid and sexual glands in mumps; as salivary secretion is controlled by the sympathetic—we cannot but believe that this also may have something to do with the carbohydrate content of the saliva in excessive dental caries during the periods mentioned in the synopsis.

THE SEXUAL GLANDS: TESTES IN THE MALE; OVARY AND MAMMARY GLANDS IN THE FEMALE.

Castration and eunuchism have long been a proof of the internal secretory action of the cells of Leydig—interstitial cells of the testes—the hormone from which controls bodily growth and the union of the epiphyses. The phenomena of senility fairly represents the further hypo-action of these cells, but it is in the relation of the corpus luteum of the ovary and fetus to lactation that our greatest interest centers. There is no better illustration of the inter-relation of all this group than in the development of mammary glands and milk secretion, which Starling([3]) and Clapon have proved can be produced independently of nervous control. Ott([13]) and Scott say, "That several glands concur to increase a secretion is well illustrated in that of milk, where we have five—infundibulum, pineal, corpus luteum, thymus, and mammary." It has also been

shown that the thyroid, parathyroids, and pituitary are prominent in this cycle, as they are enlarged and finally depleted by continued lactation. Human milk is a composite of the blood content, suited to nourishment of the child at different periods of growth, as is proved by Starling in the increasing percentage, proportionate to age, of lecithin, a phosphatic fat constructive of the nervous system. Immunity or disease on the part of the mother can be transmitted to the child by alexins and antibodies, which has been demonstrated by Welch and Ehrlich(3) in human milk, and it is probable, as all of these glands concur in its secretion, that their hormones exist as such in milk, to promote early activation of the whole internal secretory system in the child. This point will be mentioned later. The compensatory and inhibitory action of this whole group is so complicated and little understood as to be merely mentioned; for instance, the thyroid, pituitary, and sexual glands are said to co-operate, which seems likely, as all are disturbed by menstruation, pregnancy, and lactation; the thymus and adrenals are thought to oppose this group—all of which is most confusing, so you are referred to Falta, Eppinger, and Biedl; and this whole phenomena of growth of the child is recently summed up by Hasting Gilford(14) as follows:

THE EFFECT OF THE DUCTLESS GLANDS UPON DEVELOPMENT.

"We find by virtue of their secretions, or in some cryptic manner, they preside over certain correlations of the body. These correlations are by no means rigid, but indeed exceedingly variable, and the variability is most apt to be shown when circumstances are abnormal. The adjusting mechanism of development is not only flexible, but is more or less reciprocal; so that a ductless gland both influences development and is itself changed by general development.

"In this harmony, which is produced by concerted action of the ductless glands, we have reason to suppose that the leading part is played by the thyroid. This supplies a stimulus for the metabolism of the body as a whole. During infancy and childhood, when it is most important that the fires of metabolism should be controlled, the influence of the thyroid is checked by the thymus and by the lymphatic system in general." "This brings about the delay of sexual activity which is so essential to proper maturation and stability of the somatic faculties." "Probably the first to break through the cordon of conservative influences is the adrenal system, which awakens the dormant sexual organs and hastens growth of the skeletal and muscular systems. Development is further stimulated by the pituitary, which awakens every organ in the body, including sex organs. These latter ripen now apace, and assisted by the combined action of the ductless glands, some awakening and some resisting, carry the development of the body on waves and tides to its flood." From the evidence quoted it is plain that the thyro-parathyroid apparatus is the controlling factor, active in child growth, opposed or assisted by the polyglandular syndrome; this has a most important bearing on our hypothesis relative to the excessive lymphoid state and hypertrophic pharyngeal and faucial tonsils, as mentioned by Gilford(14) when he says, "The thyroid is checked by the thymus and by the lymphatic system in general," while Gierke(15) believes "that the two glands compensate." At any rate it is possible that thyroid insufficiency in infants will allow increased thymus function and general over-development of the post-pharyngeal lymph areas, producing adenoids; and it is a striking fact that the enlargement of both sets of tonsils is coincident with delayed development of the face and arch, just as it is associated clinically with malocclusion, the percentage of children suffering from all these conditions being about the same. The statements of Waller(16) and Williams(17) that these enlarged tonsils have been reduced by thyroid feeding call for thorough clinical study. There is another very prominent factor causing thyroid insufficiency, brought

out by Waller([16]) and accepted by many, *i.e.* that nearly all of these glands are disturbed in function, hence rendered deficient in secretion, by early attacks of infectious disease of childhood, measles, scarlet fever, chickenpox, etc., particularly the thyroid, and if, as stated, this gland is controlled by the thymus-lymphoid cycle, when its inhibition is removed—through damage from measles, for instance—there should be hyperplasia of all tonsillar tissue, which would shortly lead to its infection. As a matter of fact, adenoids are said to be produced by this very group of diseases, and as confirmatory of this statement, "A healthy internal secretory apparatus is considered the greatest safeguard against such diseases." It can now be accepted as proved that this cycle of internal secretory organs absolutely controls the formation of the facial bones, nasal and postnasal, as well as the teeth and their eruption—here too, we believe, if it can be established, that the thyroid is predominant, and any defect in it will act through all, seriously delaying development. Thyroid insufficiency and its expression, cretinism in children, is quite the commonest of all the marks of defective internal secretion, and we again call your attention clinically to the mouth and pharyngeal defects of pronounced cretinism—the premaxillary protrusion, the irregularity of the teeth, the closed sinuses and deflected septa, the enlarged tonsils and tongue—and ask that you compare these with the more minor defects which we are called upon to correct. The enlarged tongue, associated by medical observers with these conditions, is interesting, and the question arises, Did the hyperplastic tongue protrude the teeth, or the narrowed arches crowd the tongue into the pharynx and produce mouth-breathing affecting the arches, according to Cryer's idea? As deficiency in the cretin at first prevents development and the closing of the sutures and epiphyses in long bones, where they finally ossify in shortened relation, as in the dwarf, with synostosis of the skull and face bones, as Starling([3]) states, why should it not, in the child suffering from athyrosis in less degree than in the cretin, delay the closing of all the sutures which go to unite the face to the skull —viz, the palate, sphenoid, ethmoid, nasal, malar, vomer, and maxillary, and then ossify these undeveloped sutures in distal relation, preventing forward and downward development of the maxilla and mandible, locking the whole area in faulty occlusion, which will in turn interfere with full development of all the accessory sinuses and nasal septum?

We can consider now with profit the periods given by various anatomists, who do not wholly agree, for the closing of these sutures. The body of the sphenoid is developed in two large sections; the post-sphenoid, containing the larger part of the sella turcica and the posterior clinoids, and the pre-sphenoid, containing the lesser wings and anterior clinoids which unite to form the basilo-sphenoid, directly under the pituitary body, a little after birth, in the first stress period of growth. It is easy to conceive how hypopituitarism might be induced, by delay in development of this area, previously ascribed to thyroid insufficiency, by imprisoning the growing gland in undeveloped bone; this is confirmed by studies of the sella in cretinism already quoted, and Gilford's([30]) report of a case of ateleiosis (arrested development) where he says, "The pituitary is apparently encroached upon by the projecting clinoid processes." Further, the greater wings, the third free portion of the sphenoid at this period, do not unite with the basilar portion until the end of the second year; as these wings articulate with the palate bones, which in turn join with the superior maxilla, they are the strongest sutures of the internal attachment of the face to the base of the skull, and Cryer says, "They give support to the superior dental arch." It is more than significant that nature leaves this area unattached until all the temporary denture is fully in occlusion, and that ossification is not complete between the basilo-sphenoid and the basilar portion of the occipital bone until between the eighteenth and twenty-fifth year. The palate bone, the wedge

which unites this whole area through the greater wings to the maxilla, is developed early, ossification proceeding from two centers, for the perpendicular plate passes toward the articulating edges, which, due to any deficiency in internal secretion or calcium metabolism mentioned, could be delayed in ossification, just as the epiphyses of long bones under like condition. The zygomatic portion of the temporal, which articulates with the similar process of the malar, bracing the front of the face, does not unite with the rest of the temporal bone until well into the first year after birth. The crista galli and perpendicular plate of the ethmoid, which form the anterior superior support, do not begin to ossify until the end of the second year, and spheno-turbinates, entering into this articulation, are not attached to the sphenoid until the second or third year. The vomer, keying this region to the maxilla, develops from two laminæ, inclosing the cartilage by two centers, which are not entirely completed until puberty. Coming to the maxillary bones, the premaxillæ are supposed to unite shortly after birth, but it is interesting to find Mosher([18]) contending that they really are not completed until the third or fourth year. "Prior to that time," he says, "they are mere shells holding the temporary and permanent teeth, and do not acquire solidity until the permanent incisors are well on the way to eruption." That the palatal processes of the maxilla rarely develop to full width is shown by the lingual relation of the molar region, which in orthodontic work nearly always needs expansion. You will no doubt associate these periods for the closure of this region, articulating the face to the skull, with Cryer's remark as to how weak this union is to any force applied from within outward, and the striking resemblance of the time named for suture hardening to tooth eruption, which begins for the deciduous teeth about the sixth to eighth month after birth and is about complete by the second year; and particularly the early advance of the first permanent molars, which is complete between the fifth and sixth years. None of the numerous theories explaining the eruption of a tooth are satisfactory, as are none of the theories for the formation of accessory nasal sinuses. W. B. Davis([19]) described the formation of an embryonal epithelial pouch, which lies against the bone, producing absorption; this invasion is followed by the entrance of air, or pneumatization, and this whole process is strikingly similar to the eruption and advance of a tooth; the bony crypts are resorbed and built again, just as the tooth erupts. Whatever may be the primary cause, both of these processes come under the supervision of vasomotor and trophic nerves of the sympathetic, which has been shown through the chromaffine system to be controlled by internal secretion, any insufficiency in which would interfere with the synchronism of all of this growth, which is marvelously timed in the normal. If this be true, such defective secretions may delay sinus development, as well as cause irregular dentition, producing malocclusion and dental impaction, with pressure areas on certain nerves, ending in the "stress of dentition" which Kirk([20]) has shown may extend its neuroses and reflex irritation even up to the time of the eruption of the third molars. Josefson([21]) presents in a recent report a mass of radiographic and clinical evidence to show that tardy dentition is a warning that development of the body is not progressing as it should, and claims there is some disturbance of the whole ductless gland system. He recommends systematic organotherapy during pregnancy, in families with a tendency to abnormal dentition and growth of hair; and many medical observers insist that there is early resorption of roots and loss of deciduous teeth in rhachitis and tetany, and quite the reverse in tuberculosis. When we consider the embryology of this whole question—the evident analogy of epithelial enamel and hair; the development of the maxillary arch, for instance, and the greatly divergent "anlages" from which the premaxillary portion has to descend and the palatal processes ascend —when statements such as Josefson's are

daily occurring in medical literature, it behooves the dentist to prove—or as often disprove—every word of them. We believe one of the principal causes for internal glandular insufficiency to be the present method of artificial feeding of infants, and that correct baby-feeding is one of the keys which will unlock this problem. Cow's milk, which may be modified to the correct percentage of protein, salts, and carbohydrates to suit the growing age of the child, is lacking in certain vital and yet unknown factors contributing to bone growth and preventing such conditions as tetany, rickets, etc. It has already been shown that immunity, as also disease, may be conveyed from the mother to the child by breast-feeding; that many internal secretory organs preside over lactation, particularly the thyroid. Bramwell and many others have increased the milk of wet-nurses by thyroid feeding, and "It is quite probable that some internal secretion necessary for perfect nutrition is secreted in mother's milk that may be absent in cow's milk, hence bottle-fed children may not receive it."(22) Meigs and Harsh(23) report that "Human milk differs in three ways from cow's milk: First, having considerably more lactose; second, much less protein; third, more substances which are important constituents of diet and are soluble in alcohol and ether, but which contain no nitrogen and whose chemical nature is unknown. In the middle period human milk contains 5 per cent. of this substance, while cow's milk contains but 3 per cent." Starling and Clapon confirm the fact that these substances vary with different species, Starling(3) saying "It is impossible, therefore, satisfactorily to replace the natural milk of an animal by that of another species." Besides these activators of the internal glandular system there are just as important elements, such as various salts, and particularly the lecithin content. Lecithin is most important in building the central nervous system, and Starling proves that we have a progressive adaptation of milk to growth according to the lecithin content for each species—"thus the calf's brain is only one-thirty-seventh the weight of the whole animal, while the human brain is one-seventh, hence the infant would require more lecithin."(3) It would, then, be impossible to start into function the whole internal secretory system with manufactured baby foods containing no activators; this cycle would be activated earlier with cow's milk containing 3 per cent. of such substance, but still there would be that delay which we consider the real cause of many of these dental ills, even with modified cow's milk; while with the breast milk of a healthy mother all of the syndrome of growth quoted from Gilford would be started at once in the extra-uterine period—preventing, we believe, defective forward and suture development, stress of dentition, enamel hypoplasias, and such symmetrical enamel defects as lay the tooth open to caries. W. A. Price(24) associates a number of cases of enamel hypoplasia with artificial baby foods and in a strong *résumé* censures the users of such foods. In discussing this report, Dr. E. C. Kirk(24) said, "It has been pretty definitely shown by a number of observers that the secretions of certain of the ductless glands, particularly the parathyroid, has something very definite to do with the process of calcification; that where the parathyroid is destroyed or diseased we may feed phosphate food and it is not assimilated; and the quantity of phosphatic food that is taken into the stomach under these circumstances is rapidly eliminated in equal amount. It is also pretty clear that, in the milk of the nursing mother, certain of these important stimulative properties of the ductless glands pass, and though the child may receive phosphatic nutrient materials in some other form, it is the lack of the stimulus which prevents the child from assimilating the phosphatic elements of artificial foods." Many agree with Starling(3) when he says, "There is no doubt that of the children dying during the first year of life, four-fifths are murdered by unnatural methods of feeding." W. H. Davis(25) states the fact, "that the bottle-fed baby is six times as likely to die as the breast-fed."

While no doubt part of this percentage is due to intestinal diseases. there is another element in the accepted fact that "The bottle-fed baby is much more susceptible to communicable diseases than the breast-fed baby." Erdlich and Welch have proved that the antitoxins pass over from the mother to the child in human milk which "will provide it with a certain measure of passive immunity against possible infection by disease to which its species is liable."(3) Now, this is most important, for it has been already established that the organs of internal secretion in childhood are peculiarly liable to damage and insufficiency from such early attacks, as measles, chickenpox, etc. In the bottle-fed baby this immunity is not maintained, and such diseases may result in glandular insufficiency, which from any cause will induce dental lesions, and enamel hypoplasias have for years been associated by the dentist with such infectious diseases; it also explains the writer's series of such instances collected from children of tuberculous parents. On the other hand, quite as much harm has been done by too prolonged breast without supplemental feeding, or insistence on feeding the child by a mother with defective milk; rickets and spinal deformities are quite common from this cause—all of which is made clear in recent statements, as follows(22): "It is also quite probable that some children, even if breast-fed, suffer from calcium malnutrition, because of defective secreting glands (internal) in the mother; also one or more of the glands of internal secretion in such defective children may be acting insufficiently." The writer does not care to be classed with the breast-feeding "faddists," but suggests that in the study of oral defects all these diverse conditions be reviewed. A sensible attitude is that of H. M. McClanahan(26), whose conclusion is that "unless the mother is suffering from serious illness she should nurse her infant [for these valuable activators], supplementing such nursing by other feeding," and this is practiced in several large institutions where the milk of a few wet-nurses is apportioned among all the children. Finally, the following experience of A. Hrdlicka—who has studied this whole question of the nasal passages, adenoids and tonsils, dental arches and teeth, in primitive people, from the viewpoint of comparative anthropology—is convincing: Dr. Hrdlicka reports a study of over nine hundred and sixty Apache and Pima children, and from his broad experience he states in all the children examined that—

First: There was no abnormal narrowing of the maxillary arch nor protrusion of incisors, and no irregularities, except sporadically a little crowding of the incisors, and that the arches are broader in the second temporary molar region than in the case of whites of the same type of skull, with the bones generally heavier. Second: That in all his personal experience he never saw a case of adenoids nor knew of a tonsillitis in an Indian child, although he made careful observations of the breathing of the children, both awake and while asleep. Third: The Indians have had, and still have, the habit of keeping up the nursing of the child until the second or third year, or even later; and the important fact was developed that the Indian mother gave her child various things to chew very early, while she still continued feeding late; here we have the double value of use and a natural sterile and easily digested food, supplemented by early more or less solid foods. Fourth: When asked if open-air sleeping did not prevent adenoid vegetations among the Indians, he quoted many facts to show that often the Indian (the Pima for instance) slept under the worst possible ventilation; the mud hut is often completely closed by blankets against air, and many sleep in one room. Fifth: He accentuated again his idea that evolution was going on in the human skull, face bones, base of skull, and teeth, and that it is largely due, so far as the jaws, teeth, and facial bones are concerned, to lack of use of the organs of mastication. This tendency to degeneracy, due to disuse and the still advancing evolution, must be recognized as an important factor in all of our considerations.

You are referred to Dr. Hrdlicka's numerous papers(27) on this subject, and we would accent his statement as to the normal width of the temporary and permanent arches in Indian skulls, show-

ing correct bony development of the palatal processes in the region of the first permanent molars, associated with absence of adenoids, produced we believe by correct baby-feeding and particularly early use. The metabolism of calcium and other salts is so intricately involved in this question of breast-feeding, the internal secretions, and bone and tooth growth, that no consideration of the subject would be complete without mentioning it. You have heard how the parathyroids preside in some unknown way over calcic waste, which if not relieved in youth will so profoundly affect the nervous system as to produce convulsions and death, and that calcium feeding will relieve these, as it will post-operative tetany. As confirmatory of what has been said, we quote a recent article as follows: (22) "Many of the glands which have an internal secretion, the thyroid and parathyroid, the ovaries and testicles, the pituitary and the thymus, in infancy and childhood seem to take part in normal bone metabolism." "The calcium in the blood has been found to be highest in the child, it decreases slowly with age, being higher in breast-fed than in artificially fed children, who seem to retain calcium longer and store it. . . . . and coagulation of the blood will not occur except when the salts of calcium are present." Ott (8) says, "Bones [and we might add teeth] are chiefly composed of ninety per cent. calcic phosphate and carbonate (meaning of course the inorganic content). These are the alkali stores in bone; when the quantity of alkali decreases, these insoluble calcium salts become soluble. In the period of growth of the young there is great breaking-up of nuclear substance, forming nucleinic or phosphoric acid, which may circulate in the blood, dissolving the calcium salts and causing an acidosis." We are more and more coming to understand that a condition of the body which may be termed hyperacidity, or at least a lessened alkalinity, especially of the blood, *i.e.* imperfect excretion of acids or acid salts by the kidneys or bowels, will sooner or later cause some serious functional disturbance, some degree of denutrition or serious disturbance of the nervous system; and infant marasmus and gastro-intestinal conditions are also due to diminution of alkalis. (22) Of all the phases of disturbed metabolism, calcium waste should hold the interest of the dentist; among the few coming under our notice may be named the early resorption of the roots of the deciduous teeth and their too early loss, and, for the same reason, delayed eruption of the permanent teeth; the relation of the alkalis excreted by the salivary glands to caries according to Waller's (16) idea; excessive amounts of certain forms of salivary and serumal calculus, and the opposite type of erosion mouth, one of the expressions of the hyperacid diathesis, where no deposits occur in the teeth, but the acid sodium and calcium salts produce cervical tooth destruction and have been proved in the saliva. Erosion has, in more than one instance, been associated with deficiency of the thyro-parathyroid apparatus in middle life and after, by the writer, who is also convinced that there are many varieties of wasting and decalcification of tooth structure which are primarily not the work of micro-organisms, although caries later may lodge and grow thereon, as it would on mechanical defects. It must be remembered that the periods of stress, first and second dentition, puberty, pregnancy, and senility, mentioned in the beginning of the paper, when the internal secretions are apt to be disturbed, are also the periods when caries is at its worst, and these also are the periods of defective calcium metabolism. There are also well-authenticated cases of dentinal resorption via the pulp, one of which was reported by the writer (28), which defective calcic metabolism will explain, as it does the internal dentinal defects of pregnancy, senility, and possibly tuberculosis.

In conclusion, it may be said that the dentist of the present and the future can no longer afford to conjure with such expressions as "auto-intoxication," which sound much and mean little; he must think straight on the newer lines of a pathology based on a new physi-

ology, which recognizes the internal secretory organs; and, while all disease does not arise from defective internal secretion, that has its place in our pathology, and the great problem is to properly locate it.

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[The *Discussion* will be printed under "Proceedings of Societies," in next issue.]

THE SYSTEMIC EFFECTS OF ORAL SEPSIS.

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(Read before the Section of Dental Pathology and Applied Therapeutics, of the First District Dental Society of the State of New York, January 22, 1913.)

SEPSIS comes from a Greek word meaning to make putrid, to rot, or destroy. Oral sepsis comprises all those destructive processes instituted in the oral cavity by micro-organisms and their products. These attack tissues both hard and soft, both sound and unsound. It is the effects of these destructive processes, together with the agents concerned, that interest us.

FACTORS PREDISPOSING TO ORAL SEPSIS.

Five factors in the oral cavity are of pre-eminent importance:

First. There are any number of teeth, up to thirty-two, the enamel of which may be destroyed, the dentin of which may be invaded, and the pulps of which may become infected, suppurate, disintegrate, and pass their infection into the circulation. The roots of some of these teeth either embrace or approach closely the inferior dental canal, and some of the upper ones pierce the floor of the maxillary sinus. These teeth furnish up to thirty-two possible foci of infection—channels capable of transmitting micro-organisms from the mouth into the circulation. These possible pus foci, in a great number of cases, can be revealed only by the radiograph.

Second. There are thirty-two open dental alveoli—assuming, for the sake of clearness, that the crowns of the teeth are sound—capable of harboring, propagating, and transmitting infection not only to each other, but to the blood and lymph, the mucous membrane of the mouth, the lungs, stomach, tonsils, and accessory sinuses.

Third. Assuming that both teeth and gums are sound, there are still thirty spaces between the teeth capable of sheltering and breeding micro-organisms and manufacturing their toxins. These spaces become depots in which food collects, furnishing the micro-organisms with a culture medium, and from which micro-organisms, their toxins, and pathologic products are supplied to the mucous membrane of the mouth, tonsils, glands, stomach, accessory sinuses and lungs.

Fourth. There are the tonsils, in the crypts of which micro-organisms may lodge, propagate, and be absorbed.

Fifth. Aggravating any or all of these possible conditions, there may be artificial plates, bridges, crowns, and fillings which may be wrong in conception, faulty in construction, and exert an unhygienic action, when in place, upon the gums, mucous membrane, and teeth.

Sixth. Further, any or all of the before-mentioned conditions are established in the *mouth,* one of the most vascular regions of the body. This vascularity constitutes its protection when it is sound, as well as its menace when it is diseased and its resistance is lowered.

Let us keep in mind, then, the picture of thirty-two possible foci and channels of infection in the teeth, the thirty-two open alveoli, the thirty spaces between the teeth, the tonsils, the unhygienic artificial substitutes, and the vascularity and nerve supply of the region. From these numerous foci, micro-organisms may be distributed to the blood and lymph, to the stomach and lungs, to the accessory sinuses, and conveyed along the sheaths of nerves to the brain.

Sir William Hunter restricts the term "oral sepsis" to the effects of streptococcal and staphylococcal infection. But it is recognized that the pneumococcus, tubercle bacillus, influenza bacillus, the virus of scarlet fever, measles, and perhaps infantile paralysis, and many other diseases may launch their infection from the mouth.

It should not be forgotten that all food, sterile or unsterilized; water, pure or impure; air, germ-free or germ-laden—all pass through the oral cavity, bringing and leaving their quota of micro-organisms to the already teeming resident germ population of over fifty different varieties of micro-organisms. Gordon has found over three hundred strains of streptococci and forty-eight different chemical varieties. Bearing these facts in mind, it is evident that there is at least the possibility of the oral cavity being a prolific depot for the supply of local and general infection.

To start with the beginning of extra-uterine life: Dr. Cushing of Johns Hopkins tells us that babies are born with their alimentary canal practically sterile. Within a few hours after birth, micro-organisms are found in the intestines.(1) From which end do they enter? Unquestionably from the mouth, notwithstanding Goldthwait's opinion to the contrary. So the first invasion of micro-organisms into the body comes from the oral cavity, and almost every invasion thereafter proceeds from the same source.

COMPARATIVE STERILITY OF THE NOSE AND PHARYNX.

So effective are the moist ciliary surfaces of the nose and pharynx that, in nose-breathers, few bacteria gain entrance to the trachea. The further action of the moistened surfaces of the trachea and bronchi results in the absolute sterility of the expired air of a healthy man. The same is true during quiet breathing, even when there is active tuberculous lung disease, although the fine globules of moisture which are discharged from the mouth of such a patient in speaking, coughing, or sneezing, may contain bacilli and be infectious; these globules, it is scarcely necessary to say, are formed of saliva.(2)

Thus the nose, instead of being a cavity of infection, is a protection, not a menace. Further, in a paper read before the Third International Laryngo-rhinological Congress in Berlin in August 1912, entitled "The Spread of Bacterial Infection from the Nasal and Nasopharyngeal Cavities by Way of Lymphatic Channels," A. Logan Turner states that he found, in an examination of the membranes of the noses of 16 persons and of 26 specimens, 3 to be sterile, 13 mono-organismal, 9 exhibited 2 organisms, and one 3. Pneumococcus was found 4 times, the micrococcus 13 times, the streptococcus 6 times, and five other micro-organisms once each. From this plain puritanical picture let us turn to the wild, variegated, abundant flora of the mouth, and draw our own conclusions as to which cavity of the body is logically the original source of most of its infections.

VIRULENCE OF ORAL SEPSIS.

Suppose twelve teeth or roots—which is not a large number—with an average circumference of one inch, were affected to an average depth of one-third of an inch, there would be an ulcerated surface of four square inches. Such an ulcer on the face or arm would be a subject of great concern, although the greater part of the septic matter would pass outward and not be absorbed, whereas in the mouth the pus is either absorbed or swallowed, aside from the droplets of infected saliva that become a source of infection to others.(3)

Oral sepsis is an ever-present source of danger to the individual as well as to those with whom he comes in contact. In oral sepsis no evident lesion may show, no discomfort be caused, and the cumulative effects appear only when the sepsis extends over a long period of years. Yet cases are on record in which oral sepsis has produced septicemia and death within forty-eight hours.(4)

RHEUMATIC FEVER DUE TO ORAL SEPSIS.

The systemic effects of oral sepsis are so many and so divergent that even to name them would take a good part of the time alloted to me; so I will select two related diseases, rheumatic fever and arthritis deformans, which will illustrate as well as any the importance of oral sepsis.

"The rheumatic affections, subacute rheumatism and chorea, constitute a graver menace to middle and later childhood than any other disease process."(5) It has been shown that more than half the deaths among children in the London County Council schools for the physically defective are due to heart disease, and 86 per cent. of the cardiac anomalies met with are acquired affections, principally of septic origin.

It is generally accepted that rheumatic fever or acute rheumatism is a micro-organismal infection. Whether or not it is due in every case to the specific diplococcus rheumaticus, isolated by Poynton and Pain, will not be argued here. Were it one micro-organism or a dozen, oral sepsis is well able to supply the demand.

It is about thirteen years since Poynton and Pain first published their account of the bacteriology of rheumatic infections.(6) Since then, on various occasions, they have demonstrated that a small diplo-streptococcus isolated from the blood, joints, and heart in rheumatic fever cases, and cultures taken from pyorrhea pockets, have produced in rabbits, when inoculated, all the essential lesions found in the human subject. The submiliary nodules found in the human heart, between the muscle fibers, have also been reproduced in rabbits. They are in all essential histological respects identical. All these small nodules or foci have been considered proof positive of rheumatic fever.(7)

Vernon Shaw has produced the same results in monkeys.

These results have also been produced by Walker and Beaton, Beattie, Mackenzie, Schüller, Bannatyne, Fayerweather, Gordon, Lewis, Longcope, Bracht, Wächter, Rosenow and Billings, and other workers in experimental medicine. The most recent conclusion of these workers is that, when a human being is infected by rheumatic streptococci, they enter the circulation from some tissue, as for instance the tonsil, where they have been lying dormant, in a thin stream which may continue for several days and even weeks.(7)

That oral sepsis is one of the causes responsible for this infection, the following facts seem to indicate:

An examination in London revealed 6.83 per cent. of the children in four schools, in the senior departments, between the ages of seven and fifteen, to have rheumatism.(8) In 43.6 per cent. of the cases of rheumatism in the four schools mentioned, there existed abnormality of the tonsils or pharyngeal mucosa, or both.(8) The incidence of tonsillitis and adenoids requiring an operation is four times as great in rheumatic children as in school children generally.(8)

In 13 examples of acquired heart disease, 10 were recommended for operative treatment on account of nasal obstruction or tonsillar hypertrophy. Of the 75 children, 21.2 per cent. had already been operated upon at some time prior to the attacks of chorea, for the relief of tonsils and adenoids; 88 per cent. had enlarged tonsils or tonsillar lymphatic glands of the neck, or were mouth-breathers, or exhibited excoriation of the nostrils or pus in the nasal passage. The conclusion is reached that the commonest avenue of rheumatic infection is the tonsil, and next the nose.(5)

Since those with abnormal tonsils and adenoids are mouth-breathers, and since mouth-breathing predisposes to decay of the teeth, and further, infection of the tonsils comes from the mouth, and in addition 75 per cent. of the cases of rheumatic fever occur between the ages of four and twenty years, the years in which decay of the teeth is most rampant, the chain of circumstantial evidence is complete.

In support of the relationship of acute rheumatism to septic conditions of the mouth, it has been frequently noticed

more virulent germs in greater numbers to be absorbed into the blood from the wounded mucous membrane.

(2) The coincidence of acute endocarditis with all the accompanying symptoms of rheumatic fever.

(3) The evidence of the contraction of the infection from another mouth in which pyorrhea was present, the virulence of the micro-organism increasing by passage from one person to another.

(4) The presence of a suppurating gingivitis around several deciduous teeth.

(5) The swelling and pains in joints, which passed away with cure of dental conditions.

(6) The presence of a devitalized tooth, chronic sinus and absorption of alveolus and infection of the deeper bone, which produced similar systemic symptoms to that of pyorrhea alveolaris.

(7) The use of vaccines as part of the treatment in the cure of the local systemic disturbances.

ARTHRITIS DEFORMANS, OR RHEUMATOID ARTHRITIS.

Having considered rheumatic fever, the related condition of arthritis deformans will be looked into.

Arthritis deformans or rheumatoid arthritis is a constitutional disease, not a local one. The affection of the joints is only a part, although an important one, of the morbid process.

The disease is due to the absorption from an original focus and the dissemination of either toxins or micro-organisms to the joints. The micro-organisms gain access to the blood in a majority of cases from some septic focus in the mouth, pharynx, nose, air-tubes, or alimentary tract.

A close network of bloodvessels and capillaries is situated under the innermost layer of the synovial membrane, and these undoubtedly favor the transmission of germs.

The virulence, kind, and amount of the original germ invasion determines the joint changes and the alteration of the density of the bone in the neighborhood of the joints, sometimes producing copious exudation of a serous liquid, and sometimes a purulent liquid which fills the joint and distends it in all directions. The normal contour of the joint disappears, and we observe the picture of the distended capsule.

The bones forming the joint are placed in the particular position in which it is easiest for the muscles to retain their equilibrium and at the same time to keep the joints as quiet as possible, because every movement hurts. Naturally the joint will now return to that embryonal position in which all parts of the capsule are equally distended, while its muscles are in equilibrium flexion in hip and knee joints.

These exudations are accompanied by much fever. The serous exudate usually heals entirely by absorption, while the purulent inflammation leads often to extensive destruction in the joint—roughing of the surfaces, loosening of the cartilages, adhesions of the folds of the capsule, so that a destroyed and disabled joint may remain after the healing process is complete.

CASE HISTORIES ILLUSTRATING PRACTICAL ASPECTS OF SEPTIC ORAL CONDITIONS.

Attention is called to a few cases of which a very brief description is given to illustrate the practical aspects of this study and the very sure effect of septic oral conditions.

A case of Goulden's: A man was incapacitated from work owing to effusion into the knee joint. He also had intense conjunctival and ciliary infection. He was cured by the removal of septic teeth and of a hidden necrotic root.([19])

Another case, one of Goadby's: A man had pain and swelling in the joints, anemia, and neurasthenia due to the pain and toxins. He had in his mouth four bridges, and in addition four separate crowns. Pus welled up from his gums in all directions. He said he was suffering from "rheumatism of the gums." The removal of the crowns and bridges and treatment with vaccines cured him, except for a knee joint partly disabled owing to exostosis.([20])

Lewis, in a paper entitled "Sepsis and Spa Treatment," published in *Proc. Royal Society of Medicine,* November 1912, p. 5, says:

In recent years an increasing number of diseases have been discovered to be due, in a large measure, to organisms possessing a low grade of tissue infectivity, that yet produce toxins which by gradual absorption cause changes in remote parts, the tissues containing the local nidus remaining unaffected. During the last three years a series of cases of rheumatoid arthritis occurring in my practice have been arrested, and the joint restored to usefulness, by the use of vaccines made from the pus of the patients who were suffering from pyorrhea. A case in one of the London hospitals had rheumatoid arthritis of the hip. He was operated on by a surgeon who removed the projecting osteophytes in the hope of restoring the usefulness of the joint, but failed. He came into the hands of a bacteriologist. No pyorrhea was present, but a dead tooth was, which was extracted, and a vaccine made from one of the roots. The man recovered.

The same bacteriologist had suffered from three attacks of appendicitis. He decided to have his appendix removed. Before doing so, he determined to have the stump of a tooth, the remains of a previous effort at extraction, removed. A culture was made from the root, and the same bacillus was found in the appendix. He also suffered from colitis. This yielded to treatment from a vaccine made from the root of the tooth and the appendix. He also suffered from naso-catarrh, which showed the same bacillus. After a long treatment he was cured. But what a demonstration of the potent ill effects which may result from the neglect of decayed teeth!

Further—

A case of neuritis was cured by the removal of decomposing food and stumps to which a bridge was attached, and a vaccine made from the mouth discharge.

These two cases show the direct relation of septic oral conditions to disease. The arthritic case is typical, as is indicated by the surgical operation for removal of the rough projections.

CONSTITUTIONAL DISEASE AND THE DENTIST'S RESPONSIBILITY.

In conclusion it is well to point out that while the following authorities record cases of both rheumatic fever and arthritis deformans caused by pyorrhea alveolaris, there are a great many cases caused by dead or septic teeth and by bridge work and crowns.

Lindsay in 1908 reported 172 cases of rheumatoid arthritis in which particular inquiry was made for infective foci. In 88 cases the infective foci were found. 20 of which were due to pyorrhea alveolaris, and in the majority of the 172 cases some inflammation of the mouth existed.(14)

Lambert in the same year reported 190, of which 141 (76 per cent.) had badly decayed teeth or the teeth had dropped out, and only 49 (23.8 per cent.) showed teeth in fairly good condition.(14)

Wirgman and Turner report 42 cases of gout, acute rheumatism, rheumatoid arthritis, and rheumatic conditions, in which 36 had marked pyorrhea alveolaris and 6 had septic tonsils.(10)

Goadby, 233 uncomplicated cases of pyorrhea alveolaris; 49 gave a definite history of rheumatic symptoms, 25 were arthritic cases.(16)

Grieves reports 14 cases of arthritis deformans which were either cured or benefited by removal of minute pus foci existing about the dental apical region in the alveoli.(17)

Medalia treated 115 cases of pyorrhea alveolaris, and 35 per cent. had rheumatism.(18)

Of the two factors, poor crown and bridge work and poor root-canal work, poor root-canal work is the more dangerous. Poor bridge work will soon come out, but a tooth with poor root-canal work may be the insidious source of trouble for years.

The recital of these cases illustrates forcefully and clearly the great responsibility which rests upon the dentist.

Dr. Clarence J. Grieves, in a personal letter, calls attention to the fact that there is need of the most thorough surgery in the eradication of septic foci of infection associated with diseased teeth. The blind apical abscess is that which plays the most insidious and persistent rôle in the production of systemic dis-

turbances, particularly associated with arthritis deformans.

Dr. Frederick A. Keyes also declares in a letter that St. Vincent's Orphanage has been free from infectious diseases during a period of over two years. As far as he has been able to ascertain, there is no agent other than dentistry that has contributed to this immunity from disease.

Before bringing this paper to a close, it is well to call attention to the systemic medication followed by Dr. Howard T. Stewart in his treatment of the severe cases of pyorrhea alveolaris. It may briefly be summed up as follows: Such drugs and such treatment as are used will eliminate the toxic causes of systemic infection wherever found. A clean and well-regulated intestinal tract is most necessary for a cure, maintenance of health, and building-up of resistance in the oral cavity, and the study of proper diet is considered by Kirk, Stewart, and others essential to restoring a proper balance in the metabolic processes in the body.

The subject of oral infection is just beginning to be appreciated as to its contributing influence to systemic infection. Dr. Henry L. Adler of Dallas states in a personal letter that during the epidemic of spinal meningitis in Texas, two years ago, Dr. Abraham Sophian, of the Rockefeller Institute, expressed the belief, from his observation, that a septic mouth was undoubtedly a potent contributory factor in the case of spinal meningitis; further, Dr. Albert Nash, the local health officer who superintended the treatment, states that beyond question unhygienic conditions of the mouth are predisposing factors in the development of spinal meningitis.

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Proceedings of Societies.

CONNECTICUT STATE DENTAL ASSOCIATION.

Fiftieth Annual Convention, held at Hartford, Conn., April 21 to 23, 1914.

(Continued from page 855.)

TUESDAY—*Afternoon Session.*

THE meeting was called to order on Tuesday afternoon, April 21, 1914, at 3 o'clock, by the president, Dr. James McManus.

The President introduced Dr. C. N. JOHNSON, Chicago, Ill., who read a paper entitled "Are We Maintaining Our Highest Ideals?"

[This paper was printed in full at page 805 of the DENTAL COSMOS for July.]

Discussion.

Dr. C. W. STRANG, Bridgeport. I am free to admit that I have been in some fairly tight places in my lifetime, but I have never been in a tighter place, to my remembrance, than I am this afternoon. One of the guiding minds from the great city of Chicago and the Greater West has been called and prevailed upon to halt in the busy course of everyday life and come to Hartford, and has presented to us a most magnificent paper, which I confess I feel ill prepared to discuss.

We have a great admiration for the West; we have deep respect for Chicago, and I fancy that you will agree with me when I say that Chicago cannot help but be great, because there has been so much New England blood put into the veins of Chicago. [Applause.] It has been said, and with a great deal of truth, that a noble ancestry is an inspiration to noble endeavor. Some complaint has been made with regard to the material which the dental colleges have sent out into the world, and the dental colleges have replied, "Give us better timber, and we shall give you a different product." It is the timber that makes the difference oftentimes. We would not expect an expert woodworker to turn out a beautiful piece of furniture from a piece of knotty, half-decayed wood, but if we give him a good piece of timber, he will usually turn out a satisfactory product.

I have always been a friend of the dental colleges, and in not a single instance, to my recollection, have I spoken a word that would reflect upon them. Most of them are doing magnificent work; they are sending out young men who are making good. Their faculties, for the most part, are men of high character and high ideals. In so far as the propensities of students are concerned, it is perfectly natural that the young man, knowing that his permanent success depends largely upon his manipulative skill and ability, should apply his thought, energy, and time to his prospective means of support. From personal experience I know that the young man who has little manipulative skill and ability is heavily handicapped when he goes out in the world to make his own living. I think the dental colleges for the most part elevate the ideals and purposes of the students who are placed under their care and supervision.

A number of years ago, when staying

in Copenhagen, I learned that a former graduate of the Philadelphia Dental College practicing in Copenhagen had heard that the dean of the Philadelphia Dental College was to pass through that city some time within a few days, and he met every train coming in from the south for two days, in order that he might be the first man to shake hands with and greet his old dean. Did not the dental college mean something to that man? Only a few days later, at a banquet in Stockholm, a gentleman from Spain was called upon to answer to the toast "Our alma mater." He trembled with emotion, and as the tears rolled down his cheeks he expressed in broken English as best he could the high esteem in which he held his college. Although, at the present time, in some respects the trend may appear to be in the wrong direction, on the down grade perhaps, I ask myself, Where would we be were it not for the dental colleges?

Someone has said that everything of any value has its price. Whatever we have has been paid for either by ourselves or someone else; someone's energy, someone's ability, someone's money, someone's effort has been put into it, consequently there is no getting something for nothing. In my early years of practice, I had opportunity to watch beautiful operations of such men as Varney, Webb, Atkinson, G. A. Mills, and our beloved president, and I was thereby inspired and encouraged to press onward in the way. On one occasion a patient, who had been a former patient of Dr. McManus, presented with one filling in the posterior portion of an upper left second molar. As I looked upon that filling I wondered how Dr. McManus had inserted it. I could not understand it then, and I have been wondering ever since.

I know I have not discussed this paper very well, but I feel that I have a word or two to say to the young men. When I some time ago learned that Dr. Johnson was to read a paper on "Are We Maintaining Our Highest Ideals?" the word "ideals" started a train of thought, and I have been thinking ideals all the way to the convention. I want to say to the young men in the profession, Clasp hands with that guardian angel of life, the high ideal, remembering that he who is satisfied with present achievements is barred from the path that leads to eminence. Higher, higher! Look higher, if you would live higher. And what is the ideal? Not a something that is always hanging in the distant horizon, like the rainbow toward which the child runs with open hands to grasp it. No, the ideal is one of the greatest realities in life, and every hill climbed and every hilltop conquered brings us nearer to its possession. Ideals are not creations of the brain, neither are they creations of the desire. They are not manufactured; they are discovered. Someone has said that the great musicians do not make their music, they find it; even the great artists did not make their pictures, they revealed them. The great Edison did not make electricity; he discovered its wonderful possibilities. Electricity was not made of his ideals, but it made his ideals. Music is, art is, beauty is, righteousness is, and one man comes nearer to them than another, and he talks to his fellows of the ideal, oftentimes in an unknown tongue. The achievement of the ideal does not come to the dreamer, it depends upon power and persistency of vision, and this marks the difference between the artizan and the automaton, between men and machines, between drudgery and inspiration. The ideal is one of the supremest realities in every department of life. It never drops its scepter, and this is the one salvation from a life of disappointment and despair. Someone has said that ideals are heavenly messages; they are the stars that God has placed in the sky of young manhood and young womanhood, like the other stars above the pathway of traveler and mariner, and the wise men who follow this light always reach a Bethlehem. The victorious ideal is not an occasional impulse, a momentary elevation, but rather a steady aim, a constant star, a fixed compass.

Shadowy and fleeting thoughts and purposes are like the dewdrops on the

grass-blades of the summer morning. They glisten with diamond-like brilliancy; they even reflect a world, but they are evanescent, for a breath from the opposing breeze scatters them, and all is lost.

The valuable manhood is that which transmutes and permanently transforms ideals into soul-life and character, and character is eternal.

By Dr. E. S. GAYLORD, New Haven, Conn. Our essayist has presented a paper of high order, one of intense interest to a profession for the highest professional attainments of which he for many years has stood with both pen and voice. To discuss properly the subject of a paper, it is necessary to analyze and defend substantial ideas which to a greater or lesser degree antagonize those presented by the writer. But I find myself so much in harmony with the essayist that the remarks which I shall make will in a very large measure be those of indorsement rather than antagonism, making bold to emphasize, if I may, some portions of the subjects he presents. The long recognized need for higher educational attainments for those entering the dental profession, as presented by the essayist, will receive universal indorsement—for under no other conditions can recognition and equalization be effected with the great profession with which dentistry is so closely allied. It is but a decade since specializing in dentistry was treated with derision, but today leading medical and surgical practitioners are calling for dental specialists as a co-operating factor in preventive medicine. Another decade will surely show that the real key to continued health and safety is in the hands of the dental profession. Shall we rise to the dignity and necessity of the appeal to check the overwhelming tide of human suffering?

To my mind, the essayist defends the subject of technique in a masterly manner; it is surely the alpha and omega of dental practice, and may be denominated the direct offspring of specialization. Witness the effect of the paper of Dr. J. Lowe Young, demanding the correct restoration of occlusal surfaces of the bicuspid and molar restorations in either gold or amalgam; witness also the enthusiastic response, as evidenced by the spirited discussion and ample illustrations which have appeared in several dental journals of the past twelve months. Already the time has arrived when no man who has his patients' interests in view—not mentioning his own—will fail to carve anatomical cusps and minute sulci in all operations upon posterior teeth.

My indorsement of the paper as a whole is unqualified, but if I were to place decided emphasis upon any one portion, it would be that relating—to quote the essayist—to the mad rush of commercialism besetting us on every side, which is *said to be* permeating our ranks. After an acquaintance of many years with the person and the pen of Dr. Johnson, recognizing his keen perception, I am at a loss to know why he evades responsibility in declaration. Commercialism has most recidedly entered our ranks, and attracts to an alarming degree the men who *should* stand in defense of that heritage which has been transmitted as the life-work of the noble army, too numerous to call by name, since the days of Horace Hayden and Chapin A. Harris.

It is a common phrase that "a spade should be called a spade," and none the less expressive when applied to men who pose as professional representatives, and boast of having personally received and operated on from ten to twenty and even more patients per day, making from five to fifteen fillings per hour, including a full prophylaxis treatment. Do not understand that I am referring to the so-called dental parlors; they are honest to a degree, making their work approximate the fee they collect. But the man who prefers to regard the code of ethics by neglect to print a scale of prices, and assumes thoroughly to prepare and fill five or ten cavities per hour, is deserving of little respect, disgraces his alma mater, and to the fullest extent commercializes his occupation, having no higher ambition.

Think you such men will be remembered as Dwinelle, Parmelee, Dunning, Allport, Cushing, Varney, Webb, and a host of others we might mention, who honestly prepared and filled the cavities in the teeth intrusted to their care?

Many worthy successors of these noble men I have named are in practice today, but we have too many of the other sort, men who would not allow such slopwork as they do for others to be placed in their own or their relatives' mouths. To remedy this state of affairs, I acknowledge, is a difficult proposition, as *money* is the primary factor in the mind of these men, but I believe much progress can be made, first by having no hesitation in condemning such methods when opportunity presents, and second, by explaining why proper and thorough cavity preparation cannot be obtained without careful removal of all decalcified dentin, frail walls, and observance of mechanical principles—for in no other manner can success and reliable practice-building be secured and maintained.

Dr. A. J. Flanagan, Springfield, Mass. The discussion of a paper is a good deal like the question of the orthodoxy of Tom Smith and the heterodoxy of John Jones. Tom goes to a certain church and accepts its tenets as orthodoxy, and at times he is liable to criticize the seeming heterodoxy of the other fellow.

I want first to compliment Dr. Johnson, and to express especially my appreciation of the territory in dental education known as the city of Chicago. Twenty-seven years ago, when I journeyed to Philadelphia for my dental education, following an apprenticeship of three years, it seemed to me that the center of dental education was truly said to be Philadelphia. But as time has passed on it seems as if dental literature, dental experiment, dental ethics, and a score of other factors of interest to dentistry had their present center of activity in Chicago. Dr. Johnson has almost preached us a sermon, and if we had any doubts about the sermon, we only needed to have our good pastor, Dr. Strang, finish it up. I have always maintained that dentistry gained what theology and religion lost when Dr. Strang took up dentistry.

Ideals have been spoken of, and the question arises, What are ideals? One of the greatest minds in dentistry, Dr. Garretson, maintained that one cannot make silk purses out of sows' ears. After a thorough analysis, it seems unfair to judge dental colleges, and other institutions of learning, by their finished product in its entirety.

Another question has arisen as to what culture is. I believe an Englishman has given us the best definition of culture when he said that culture in its broad sense is spreading light and truth and making God's will prevail.

In the beginning of his paper, the essayist has laid a very fine foundation by saying that dentistry is a science and an art. Now let us tarry one moment and consider the past and present, not from the artistic but the scientific point of view. Arrayed against us we have Science—which has produced facts in relation to minute forms of life known as microbes; but fully three-fourths of dentists are openly trespassing against science day by day. If my estimate is wrong, then dental as well as medical literature is misleading. Dr. Hunter dealt a well-deserved blow to dentistry. If science has established irrefutable facts, then we shall have to guide our practices accordingly.

Dr. Johnson has spoken of the lack of knowledge of pathology and therapeutics. In years gone by I have likened dentistry to a triangle with pathology and therapeutics at the top of the angle. Dr. Johnson has not overemphasized the lack of appreciation of pathology and therapeutics. He states that we must maintain a high degree of technical efficiency, which raises the question, What is the ideal in technics? Do you consider the kind of crown and bridge work we have today as coming up to high technical ideals? Dental students ask each other today why they should pay any attention to mechanical dentistry, as long as they do not have to give any practical demonstration be-

fore the board, and, after being graduated, can have the laboratory man do their prosthetic work. This, to a great extent, accounts for the lack of high technical skill in the young men who are entering the profession today. They may have high technical skill and ability in quickly taking an impression or a squash bite, and sending it to one of the laboratories, which will return a finished crown or bridge. If I am any judge of the question of technical ability, I must agree to a certain extent with the essayist that while it has been kept up, it is liable to go down.

The essayist spoke of men of prominence, who often have deprived themselves for the sake of the ideal, and he gave a list which he said he could add to materially. I would like the privilege of adding to that list the names of the late Flagg and Garretson of Philadelphia and Stockwell of Springfield, Mass.

The essayist also spoke of dentistry being money-mad. Dentistry is not alone in that; we see money-madness not only in other walks of life, but even in religion, at the present time. Think of the conditions in the public press today! Think of the thousands of churches throughout the United States which have no congregations today! That may not be money-madness, but in my opinion it is a deviation from that spirit you Chicago men are supposed to have inherited from New England.

Dr. Garretson used to say frequently to his classes that—"Things are to the sense that sees them as to that sense they seem to be," and if a man goes into dentistry with the proper sense, and that sense has its ideality, he will develop. If the college gets the wrong product at the beginning, we must not expect too much at the finish.

Dr. Strang mentioned the instance of a young man in Stockholm wanting to meet the dean of the Philadelphia Dental College. High ideals and a sense of duty were developed in that man long before he went to college. Dr. Strang also spoke against criticizing the colleges. Yet criticism may be of the greatest value at times. There has never been any progress without it, and frequently, in proportion as a thing is new or worthy, we have to contend with criticism, and even colleges and systems of education can be criticized in the proper way.

I want to thank Dr. Johnson for coming here and giving us this valuable paper. We have wished to see him here for a long time, and in closing I wish to again express my appreciation of the spirit of the scores of men in Chicago who are practicing dentistry with high ideals, and with a full appreciation of the importance of their service to their fellow men.

Dr. C. F. Bliven, Worcester, Mass. I wish to present to Dr. Johnson a much-deserved mental bouquet. Since he has discovered the pathway to the East, we hope that he will frequently visit us and favor us with more of his instructive and valuable papers.

I would like to add a word to the remarks of the other gentlemen, and especially those of Dr. Strang. He has given us a description of ideals which is based upon his early teachings, and his following of those teachings. If we wish to make progress in our lives we must be very careful about making the mistake of following the ideals of others. The man who wishes to make a real success in life must follow his own ideals and be true to himself, and if he does that, even if he enters dentistry, and is one of those "sows' ears" referred to by the essayist, he will eventually find his own place.

Dr. Ellison Hillyer, Brooklyn, N. Y. I anticipated that I would have the privilege of coming here to pay my respects to your worthy president, and not be called upon to take any part in the discussions. I have had the privilege of taking part in quite a number of organized meetings, and I must congratulate your program committee on one particular phase of this meeting. If I were to commend this committee for any one thing, it would be for having inaugurated this meeting with a paper of the character of the one just read; it sets the standard of your whole meeting. You are to be congratulated upon having

selected the one man in the United States who could have presented this subject in such a perfect way. My acquaintance with Dr. Johnson may not be as long as that of some of the older men, but my appreciation of his achievements is just as great. I would travel long distances to listen to Dr. Johnson, and I am looking forward to the time, within the next three weeks, when we will again hear him in Albany at our New York State Society meeting. As one who deals with students, that subject in the paper appeals to me most. I sometimes wonder whether a large percentage of students do not consider that the first hour I meet them is thrown away, because for a large part of that first hour I ignore the professional program laid down in the curriculum and devote my time to talking to these young men as I would to my own son, and endeavor to place before them the fact that there is no such thing as an absolute code of ethics—I do not believe in it. [Applause.] You may *write* a code of ethics, and I think I have read the current code of ethics to one class on one occasion, but I saw the utter futility of it, and never did it again, for a real code of ethics is a thing that is unwritten, it is within us, and I say to these young men, "If you have entered this profession with the idea that you are simply seeking for what you are going to get out of it, then leave it! We do not need you. Moreover, you are doing yourself and us an injustice; the primary basis upon which the profession has been built and has grown is the foundation of self-sacrifice." I do not believe there is a single dental educator who is not making a large personal sacrifice in giving up his time to teaching, and is not draining his vitality by doing so. Let me ask Dr. Johnson how he feels after seven or eight months' hard application to teaching outside of his practice.

With regard to the student, there is a triangular view of the question of dental education. There is the viewpoint of the college, of the state board, and of the student. The colleges, of which I know a large percentage throughout the country, are endeavoring to do their best. I say that without qualification. There are many failures, to be sure, and there are lots of things that will have to be improved and that we are ready and glad to improve, but progress in dentistry has come with such strides in the last ten or fifteen years that it has been almost impossible to keep abreast of it. Stop and consider; I see here graduates of ten, fifteen, or more years ago, and doubt if one-fourth of you have taken the pains to go into the colleges and analyze what we are trying to do as compared to what was done in your day. Unless you have done this, do not criticize. Criticism is gladly accepted if it is of the character referred to by Dr. Flanagan, because, as he said, progress is only made by criticism, and we are glad to receive criticism provided it is constructive and not destructive. There is a great deal of criticism of the destructive type. The colleges are trying to do their best and let us hope that in the next ten years they will show as much improvement as they have in the past.

As to state boards, I am inclined to think that they are looking at the situation somewhat from the wrong angle. I have a high regard for the state boards, and believe that they are doing a wonderful work, but does the state board ever stop to think of the product that they are examining, and the reason for their examining them? They are passing on the candidate's fitness lest he might become a menace to public health. The state board examination is not so much a question of re-examination of the candidate regarding what he knows or does not know, as it is a question of his qualification to enter the profession. This is not a criticism against any board. How many of you could pass a practical examination, for instance, in prosthetic dentistry? In New York state, where the requirements are of the same average as in most states, a man is given three hours to set up and articulate a full upper and lower set of teeth, and solder a bridge of four teeth. The bridge is presented on an articulator ready to be

taken off, and after having been inspected, it is invested and heated up, and, while it is being heated, the candidate goes on with the other part of the examination; when the case is heated sufficiently, the bridge is soldered. The candidate thus is under a severe nervous strain, as all of us would be under similar circumstances, and he may, by some little inadvertence—which happens to a good many of us, even in practice—burn a backing or a cusp, and by such an accident his whole examination is interfered with, because he knows full well that that one mistake will perhaps "throw him down." At the end of the three hours he may or may not have done his best. I have seen good men whom I knew to be capable of doing good work, fail in some part of this work, and I therefore feel that the student should be granted a little more consideration under these conditions.

As for the student, what can be expected from him after three years' training? He is just ready to commence, as the word commencement indicates. Dr. Flanagan and also the last speaker spoke of sows' ears, and I have sometimes wondered how we are to say which are the silk purses and which are the sows' ears. It is not always the man who presents a fine appearance who is *per se* the gentleman, nor is the man who carries himself well always the best man. With such a number of students as we are forced to deal with in New York, I have seen some men whom I have been inclined to pick out, and to say, "You are not fit in any way for this work, and had better quit; you have spent a certain amount of money, do not waste any more; you had better take up something else, blacksmithing or the like." Yet, strange to say, after five or ten years, I have found some of these men doing honorable and good service. Now, gentlemen, were these men sows' ears?

Dr. J. Leon Williams, London, England. I am going to speak tomorrow on a subject that will involve one phase of Dr. Johnson's subject; so I think I should not say much today. I do, however, want to thank Dr. Johnson for the privilege of listening to his paper. It is a tremendous subject, this subject of ideals, and has a dozen phases, any one of which might be discussed for an hour.

I have come in contact with dentistry and dental practitioners in different parts of the world, and have just been wondering if we are really willing to look all the facts fairly in the face. The idea of the paper is, Are we maintaining the ideals of dentistry?—and the trend of Dr. Johnson's conclusion appears to be that the men of today, or at least many of them, think much more about the money they can earn in dentistry than about the quality of the service rendered, and that, from this point of view, our ideals are not as high as they were forty years ago. There is no doubt some truth in this statement, but we have to keep in mind the fact that in operative dentistry, at least, the general level of excellence of service rendered is much higher than it was forty years ago. At that time there were a few men who stood head and shoulders above the general level of the profession, but they were conspicuous because of the lower standard of the great mass of the profession. Those men would not be especially conspicuous today, because there are hundreds of men in all parts of the world, who are perhaps unknown outside of their own locality, but who are, on the whole, rendering better dental service to their patients than any of those men did whose names have been mentioned. It is true, this does not necessarily mean that their ideals are higher, but it does mean that there has been progress in the quality of dental service, and in this sense ideals are higher than they were forty years ago.

We have also to remember that prophylaxis is the ideal in dentistry today, that many believe we are approaching the time when what is usually called operative dentistry will hardly be needed. Truly, that is a higher ideal than anyone dreamed of forty years ago. And now let us try to analyze a little what Dr. Johnson has said about the place money occupies in the ideals of many

members of our profession. I agree with every word he has said as to the facts. But is there not something more to be said? I think so. Why do men sacrifice so much for money? No one loves money for itself, but for what it represents. It represents everything that man needs and wants, but I believe that man's deepest desire for money is based on his love of power. All men love power; it has even been the besetting sin of the church through all the centuries. While there are many ways of acquiring power, the average man soon discovers that the easiest and quickest road to power for him is by the accumulation of money. He looks about his own community, and he sees that, as a rule, the men who have the most money wield the most power. This love of power is the strongest motive in the heart of the average man of today. Will you tell me how we are to displace it by the exercise of any principle on which the civilization of today is based? That is what I mean when I ask, Are we willing to look all the facts squarely in the face? The hope of success in maintaining a high standard, a high ideal in dentistry, lies largely in the work of convincing the student that increasing intelligence and knowledge on the part of the public makes necessary an ever-improving quality of efficiency in service. The history of the men who have sacrificed themselves for an ideal in dentistry, leaving wives and children to be very casually looked after by those whom they had most benefited, is not calculated to inspire the average young man with a consuming passion to go and do likewise. And when this average young man looks about to see who is most honored in his profession, he soon discovers that it is all too frequently not the man who is rendering the best service; he discovers that both honor and power come to the men who have money. If the leaders in the dental profession wish to see their young men maintain a high ideal of service, if they wish to see everyone in the profession contributing the best that is in him toward professional advancement, the first and most important lesson for them to learn is that the obligations of the profession to those who give all they have cannot be morally discharged by a nice little obituary notice in the back pages of dental magazines.

Dr. O. T. Rule, Stamford, Conn. Perhaps what I have to say may not be appropriate, but I would throw a little light on this subject from a different angle. When it comes to the question of men going after money in dentistry, I think we are nearing the fundamental necessity of every man having to earn a living. I believe that the great majority of men take up dentistry because they think they can make a better living than in some other way. The parents say to them, "When you grow up we want you to be able to make a better living than we have made," and that is the idea the boys have when they study dentistry—you will agree with me that this is true of the majority of dental students. Ideals, I think, are in a majority of cases the result of teaching. I ask you if a young man be apprenticed to a practitioner who is lacking in ideals, or if he goes to a college and is not allowed to read or hear any discussion on ideals in dentistry, what will his ideals be? He will not hesitate to accept patients from his neighbor across the hall, and no matter what the circumstances be, he will not consider his brother practitioner at all. This, I believe, is the rule. Therefore those who teach the greatest number have the greatest field and the greatest opportunity, and on them rests the greatest responsibility. The teachers of today are the professors in the dental colleges, and as a whole they are discharging their responsibility well. Very few young men enter college from offices, and not all of those who enter from some practitioner's office have been in offices where ideals are highest. I had the experience of being in an office without ideals, and as for ideals, I did not have any. I learned my ideals from the teachings of my professors, and I happened to be one who believed in them. A previous speaker has said that he does not believe in printed code of ethics. I do. Such a code appeals to me as being of great help

in striving to reach one's ideals. I did not know the code of ethics of this society until I joined. And I subscribed in my mind to that code. We may not be able to publish a fully expressed code of ethics that should govern us, but even a partial code of ethics is valuable, and should be published.

In regard to the question as to whether we have maintained our highest ideals, it seems to me that we have raised them. Maintaining means keeping up to a certain point. I think, as Dr. Williams has just said, that the ideals have been advanced greatly. If we say, Are we measuring up to our ideals? I think each one can answer that, and must answer No; but I believe it is true that our ideals have been maintained, and have been advanced. In the lives of some of the men mentioned by Dr. Johnson, the influence for high ideals was individual or personal, *i.e.* one person influencing another. Ideals may also be collective, as, for instance, the ideals of this or some other society, and I want to make special reference to what may be called the collective influence toward ideals in our own midst. Fifty years ago, in this state, the dentists were at loggerheads with each other; they were not willing to speak to each other, as was set forth in the "Call" at that time. An effort was made at that time to form an organization for the promotion of good fellowship between the dentists of our state, and among those prominently identified with this movement stands the name of our president, who through storm and sunshine, favor and disfavor, has kept up his ideals and enthusiasm, always working for the advancement of his profession, until at length, aided by others also possessed of high ideals and unflagging zeal, we have in our society the result of the collective force of ideals. This, however, strongly emphasizes the priority in time, importance, and necessity of the personal or individual standard of high ideals. I want to pay this tribute to Dr. McManus, and felt this morning, when his address was read, that it was one to which we should make special reference. I am glad to have had this opportunity to pay him this personal tribute.

Dr. JOHNSON (closing the discussion). I want to express my personal appreciation of the splendid way in which my paper has been discussed. I want to call attention to Dr. Strang's opening discussion, which seems to me a better effort than the paper itself. I have known Dr. Strang by reputation a very long time, and he is to me typical of the highest ideals in the practice of dentistry. As to Dr. Gaylord, you all know him. I was going to say that you know him better than I do, but I do not believe you do. Dr. Gaylord said something of my coming a long way East, and hoped that I would come again. Why, bless his heart, my grandfather was born in Rhode Island; my grandmother was born in Boston, and I am simply coming back home. I have tried for a long time to come to the Connecticut Association meeting, but there are so many things that need to be done in the West, and I have been extremely busy, but I have always looked forward to this, and when the invitation came from Dr. McManus to this fiftieth anniversary, to be celebrated under his presidency, I could not resist, and I was glad to pay my personal tribute to that magnificent man.

I thought after writing the paper that it was like bringing coals to Newcastle to talk about ideals in a community that had developed such men as you have here. I could mention many of them, but they have been mentioned in the President's address this morning. They range with Hayden and Wells, on whose monument I had the pleasure of looking today for the first time.

Dr. Gaylord referred particularly to the young men, and I want to emphasize that phase of the subject. You know it does not make so much difference, after all, in a professional way, what the older men are doing. Their time has gone; their influence is a thing of the present and past instead of the future, and I am always looking toward the future. I am not quite old enough to reminisce very much, and I am looking to the

future all the time, and it is that future that I am anxious about. It is upon the young men that we must depend for the development of the future, and everything we say in regard to high ideals or ethics should appeal particularly to them. Do you know that if one of the older practitioners today stumbled and fell and put an advertisement on a fence bigger than himself, I would walk up to him and take him by the hand, because I have known some of the circumstances that have brought the older men to do such things. But I like the young men to maintain high ideals. I think the men of the past, as I was saying to Dr. Williams this morning, did not have instilled in them the necessity for high ideals as the men of today have, and if a young man goes wrong today, it is his own fault. It may not be his fault mentally or morally, but he at least does it with his eyes open.

Dr. Flanagan spoke of criticism; there is nothing more valuable, unless it be encouragement, and encouragement sometimes is as valuable as criticism. That reminds me of the story of a man who met another man who had been a keen observer, and he said, "You may travel from one end of the world to the other, and examine the cemeteries all over the world and read the epitaphs on all the tombstones in these cemeteries, and you will never read one which says, 'This man died of too much encouragement.'"

Dr. Flanagan paid a very beautiful tribute to Chicago, but I want to correct an impression he may have made. I have heard the statement before that the center of dentistry today is in Chicago. I deplore the fact that it was ever said, although I appreciate the courtesy of the man who said it. There is no center of dentistry. I also deplore the use of the term "American" dentistry. Gentlemen, it is all dentistry, no matter where we are located and practice. If we are doing the best we can, no matter how many times we fail, we are all dentists of exactly the same merit, and I should be fearful of the future of dentistry in Chicago if it ever became a conviction in the minds of the men of Chicago that that city was the center of the profession. The moment a man feels that he is at the top, or a community feels that it is at the top, or an institution, or a nation, that moment is a dangerous point in their history. And so I do not want the impression to be conveyed that we of Chicago feel that we are the center of dentistry. We are doing exactly the same as you are doing here, working together for the progress of the profession we love so well, and that is all.

A few weeks ago we had a meeting in Chicago of which I am proud as a Chicago practitioner, and I have heard the statement on several occasions that in no other city could there have been gotten together the same number of men, and the same kind of meeting organized, but I am not willing to believe that. We did have a large number, and we are proud of the fact that so many came to Chicago to help us celebrate our fiftieth anniversary, but I believe that the same number of men and the same kind of meeting could be had in any other city of that size, if men went at it in the same way and worked as long in advance for the meeting as we did in Chicago—the development of that meeting having been going on for nearly a year. One thing that is in our favor and that helped to make our meeting a success is that we are geographically a center; it is easy to get to Chicago from any direction. That is all there is to it. If you come there we want you to feel at home, but we do not want anybody to feel that we think that dentistry in Chicago is one iota advanced over dentistry in any other place. There may be one thing in our favor probably, and that is that we as a profession live in harmony.

Dr. Flanagan mentioned the fact that the strictures of Hunter on our profession were well timed. While I wrote an editorial at that time criticizing the remarks of the journal that quoted Hunter, I feel that, if the journal which made those criticisms had properly read the *Lancet* article, the dental profession would never have taken exception to it

at all, because every stricture that Hunter laid on the dental profession had been laid on the profession, not by outsiders but by dentists, long before Hunter offered them. It was only the distortion and the apparent slur on the profession which caused that article to meet with resentment from the dental profession. The facts expressed by Hunter have been admitted long ago, and it cannot be successfully denied today that much harm has been done to people by injudicious crown and bridge work, that infections have taken place as the result of such work; but that does not entitle any man to say that all crown and bridge work is a curse to humanity—and that was practically the statement made in the lay magazine.

Dr. Williams made the statement that the reason why the American people are clamorous for the dollar is because it represents power. That is a fact, but the thought that I am trying to bring before the profession is that there is another kind of power for the professional man, aside from the power of the dollar. That is the mark I desire my profession to keep in view. There are men in the world who have exerted an immense influence on the community for good, who never had a dollar to their name, and the highest kind of power and the best power in professional life is the power that is developed aside from that which is gained by the dollar. We are concerned with an entirely different relationship—and I do not say it with any reflection on commerce, because I respect that; we are "dealing with" the community in an entirely different respect from the man who sells goods over the counter. The individual who steps up to the counter to buy goods has some idea of the goods he is to buy, and he has some protection in his own knowledge, but with dental service it is different. The patient takes the chair and is entirely ignorant of the service to be rendered to him; and I hold that the moral and professional obligation of the dentist represents a relationship essentially higher than that of the business man to the community—and it is that distinction between commercialism and professionalism that I want to emphasize today. It is the difference in dealing with things and dealing with persons, and when one comes into as close personal contact as the dentist does with the people, there is a moral obligation that is different from the ethics of trade. I want you to go away today with that thought in mind. I believe that the teacher who does not hold that in mind is failing in his work. Our duty lies not only in imparting technical and scientific knowledge, but in that development of character which we, by example as teachers, are able to instil into our classes.

The President then appointed as the Committee on Nominations Dr. F. Hindsley, Bridgeport, Dr. W. O. Beecher, Waterbury, and Dr. D. W. Johnston, New Haven.

The association then adjourned until the evening session.

TUESDAY—*Evening Session.*

On Tuesday evening, a meeting open to the general public was held, at which addresses were made by Joseph H. Lawler, mayor of Hartford; Hon. Simeon E. Baldwin, governor of Connecticut, and by the president of the association, Dr. James McManus, Hartford.

Lantern lectures were also given by Dr. W. A. White, Phelps, N. Y., of the New York state department of Health, on "Oral Hygiene," and by Dr. Thomas Darlington, New York, secretary of the Welfare Committee of the American Iron and Steel Institute, on "Welfare Work in Industry."

WEDNESDAY—*Afternoon Session.*

The meeting was called to order on Wednesday afternoon, April 22d, at 3.30 o'clock, by the president, Dr. James McManus.

Dr. McManus introduced Dr. CHARLES R. TURNER, Philadelphia, Pa., who read

a paper entitled "Full Upper Plate Retention: A Critical Study."

[This paper is printed in full at page 917 of the present issue of the Cosmos.]

Discussion.

Dr. N. A. Stanley, New Bedford, Mass. I do not know why I have been delegated to discuss this paper, as I am entirely incompetent to do so in a technical way. For fifteen years I have done no plate work in practice, but I became interested last October in a new method of taking impressions, and felt that, if I could master the technique of securing more perfect impressions, I could do better work along prosthetic lines than ever before; therefore I intend going at it again, and hope to accomplish better results than when I did this work in practice. Dr. Turner's presentation of this subject is a stimulus for us to study more deeply the technical workings of this phase of our art. Everything is being studied more deeply of late; there is a scientific way of doing everything. The teeth that are now put on the market are more nearly anatomically correct, and of better shape and color, than ever before.

With regard to taking impressions, it seems to me that the obtaining of an accurate impression by a study of the parts in each individual case is the whole secret. I have always used plaster, but it seems to me that, in order to secure ideal results, we must use an impression material that allows for free motion and play of the parts while it is in the mouth in the same manner as after the plate is made. In my opinion, a modeling-compound impression lends itself more kindly to this result than plaster, as it yields more readily to the lip and cheek when being shaped. I had supposed that atmospheric pressure played a greater part in the retention of a plate than we have been led to believe. I have never used the vacuum chamber to any great extent, always relieving the model by scraping the plaster impression along the median line. I have never, however, studied this question as carefully as it should be studied to secure ideal results, viz, by careful examination of the mouth where the rim of the plate touches the tissues which prevent air from getting under the plate. I believe, if we can master the technique of securing an accurate impression, we shall do better work for our patients than ever before.

Dr. A. J. Cutting, Southington, Conn. There is little if anything I can hope to add to elucidate, or any points to make, regarding Dr. Turner's paper.

His conclusions in nearly every case are in the main the same as the ones to which I have been forced by my practice of many years. Such men as Dr. Turner and the other essayists of this meeting, who are able to present the detail of methods of work so clearly and ably, render it possible for our young men to produce results more quickly and successfully than was formerly done.

In the opening of his paper, Dr. Turner made a statement I wish to emphasize, viz, that concerning individual requirements of every denture we have to make. I believe this is not taken into account as fully as it should be. Each denture demands special treatment to meet the particular requirements.

Too little attention has been given to this phase by the average dentist in recent years. So many dental laboratories and so many advertising companies are offering full dentures for little or almost nothing that ethical dentists have come to feel that this part of their work is beneath them. How common it is to hear dentists make the statement that they cannot afford to do vulcanite work, and when they have to do this kind of work, they either send it to a laboratory or the office help does most of it. When the methods advocated by the essayist are carried out, the laboratory or assistants cannot do this work except under the immediate supervision of the dentist who knows all of the particular requirements of the case in hand. And this is most essential to obtain the best results; anything else appears to me like a shot at random.

I emphatically indorse the sentiments

of the paper, with the exception of the essayist's conclusion about the vacuum chamber, which he says "should seldom be used at all." I have been an ardent admirer of that master prosthetist, Dr. L. P. Haskell, who makes similar claims, and again and again I have tried to adopt this procedure, having been won over to it by his claims and the theories advanced, but I confess my inability to get the same universally good results without the vacuum chamber—and it is the results obtained in the mouths of our patients that we are after.

Like others, I do not believe that much if any good comes from the vacuum chamber after the denture has been worn a short time, owing to the so-called vacuum becoming filled-in with mucous membrane, but it is at the beginning of the patient's experience in wearing the denture that we need the help which the vacuum chamber usually gives. If we do not make it too deep, or its edges too sharp, the thickening of the membrane caused by it will have no deleterious effect. Personally, I cannot comprehend the practical difference between a shallow so-called vacuum chamber properly placed and made, and the relief advocated to be obtained by a sufficient number of layers of No. 60 tin foil. To me, the results are the same by whatever name the means used are called whereby we obtain these results.

I heartily agree with the essayist in the statement that we should never rely solely upon the vacuum chamber for the retention of full upper dentures, neither have I any patience with universal adoption of soft rubber disks or adhesive powders for the same purpose.

With the essayist, I believe that the merits of the work demand that the dentist shall do his best, in the same way as he is supposed to do in all other lines of dentistry, so as to adapt the denture as nearly perfectly as possible according to the anatomical requirements of each individual case.

If this is done, and if the patient intelligently understands what is to be reasonably expected, and what part he must play to bring about the expected results, general satisfaction to both patient and dentist will be obtained.

Dr. O. T. Rule, Stamford. I note that Dr. Turner kept strictly to the subject of his paper as announced, viz, the retention of full upper dentures. I wish that in his closing remarks he would digress sufficiently to tell us something of the retention of partial dentures.

Dr. Turner has not mentioned a procedure that may be helpful to some, viz, what may be termed the bead edge, as compared with the vacuum chamber. I had occasion to make a plate for a man, and at first I was not successful, and finally tried a different plan. I took another impression in plaster and made a groove around the model where the edge of the plate was to be and vulcanized a wire staple over the alveolar ridge at the median line. There were no teeth on this plate. It was just a plate to test the adhesive power, and the staple simply served as a dislodging lever. By pulling forward and upward on this staple, the plate could be removed, and by the amount of force required to do this, it could be determined whether the strength of the adhesion was satisfactory. I explained the purpose of this appliance to the patient, and told him to try it at home and let me know in a day or two how it worked. At that time, in reply to my question, he said, "'Does it stick?'! I thought I would never get it out." This was not atmospheric pressure, because there was no air-chamber. I had prepared the model and impression as at other times, by scraping the impression in the spots that were hard, and scraping the model in the spots that were soft. The value of the bead is this: If we have perfect adhesion, we have the strongest retention, and the bead interrupting the plane surface of the plate, forms a barrier to the air, and so renders it more difficult for the air to gain ingress, and makes the retention stronger. I think it involves somewhat the same principle as we apply in porcelain inlays where we use a tip to restore the edge of an incisor, that is, to have

the inciso-approximal edge not directly straight from the labial to the palatal side, but rather a little curved so that there will not be that direct action of the fluids to wash the cement out of the joint. Perhaps the same principle applied in plates will give us a stronger retention.

Dr. Ellison Hillyer, Brooklyn, N. Y. I did not quite get the trend of the last gentleman's remarks. I would like to ask him what the staple was.

Dr. Rule. It was just a simple lever. It was a vulcanized staple which, when pulled upward, would exert force in the same direction as that which the lower incisors exert against the upper in the act of mastication.

Dr. Hillyer. I would very much like to see a model of it.

Dr. Turner's paper has covered the ground so thoroughly that it can be merely favorably commented upon, and leaves but a few questions to be asked. Possibly he did not lay as much stress upon the modeling-compound impression as he really might have done—for I believe that all of us agree with Dr. Stanley that there is a great deal more in it than we have given it credit for. I have tried to give it a good test for the last few months, and must say that my results are quite satisfactory. I think all of us realize that there is a great deal of fault to be found with plaster. I have been a great adherent of it for impression taking, and am not through with it yet, by any means.

I would like to ask Dr. Turner what he did with that case that showed excessive tissue in the incisal region with two large flaps on the side. It was my good or ill fortune within the first year of my graduation to come across one of the most profound examples of that anomaly I have ever seen. I think there must have been at least four ridges, one after another, drawn in about the area of the gold base, and still the denture had been worn by the patient for fifteen years. It was necessary, in order to get anything like a solid base, to take two impressions. Endeavoring to get an impression of the hard part, leaving out the soft ridges, I could not obtain a satisfactory result with any material. Finally, taking the duplicate of the original, with my assistant holding the parts aside, I carved it down to shape, and from that I was able to make a perfectly satisfactory denture.

I have had suggested to me a new idea in regard to the soft tissue, which I confess I have not tried, but which I expect to try on the first case in which I can induce the patient to consent to the treatment. This idea has been given to me by Dr. Ruyl of New York. Dr. Ruyl, when in Germany visited one of the large foundries of the Krupp Company, where a medical attendant takes care of the health of the workmen. The efforts in this direction in that foundry include the care of the teeth. When a man has to have all his teeth extracted, he cannot afford to go for a year or eighteen months without a serviceable denture. They not only extract the teeth, but excise the *soft tissue and all of the alveolar process at once.* The result of this is that inside of thirty days the mouth is where it would have been six months afterward, under normal conditions, and I believe, with the methods of anesthesia that are coming to the front today, it will be a comparatively simple matter to so anesthetize the parts as to make it possible to excise all of the soft tissue and denude the bone of alveolar process. I predict that, in time, this will be *the* method *par excellence.*

As your guest, I had the pleasure of endeavoring to present you a few points in the clinic, showing what we are trying to do with our present students. When considering the matter of making a full denture, I am surprised to find how many practitioners do not use the face-bow in transferring the bite from the mouth to the articulator. It is such a simple matter to use the face-bow, and it is such an indispensable aid in getting satisfactory results that I would advise all of you who are interested in this work, to get a Snow face-bow and an anatomical articulator.

There is one phase that Dr. Turner did not bring into his discussion, that is, the changes which plaster undergoes even after we have made ordinary provision therefor. We know that plaster softens in subsequent procedures of vulcanization, and until we secure some material which will give us a stable cast, we are not sure of our results. I am looking forward to the time when we will have a cast that will result from the spraying of metal upon the impression almost as soon as the impression is taken. This is being done in the fine arts in Germany today, and while it will require extensive experimentation, I believe that it will be worth while for men interested in this work to make such experiments, looking toward its adoption in the prosthetic field of dentistry.

Dr. TURNER (closing the discussion). I wish to thank you first most heartily for your courteous personal attention and your kind discussion of my paper. I have very little to say in reply to the gentlemen who were kind enough to speak on this subject. I regret that time and opportunity fail to permit me to respond to the wish expressed by one of the discussers that I take up the matter of retention of partial dentures, as this is quite as large a subject as the one to which we have devoted so much time already, and I think if he will pardon me I shall not accede to his request, though I might like to do so.

Modeling compound as an impression material undoubtedly has advantages, and when I see results in plate retention obtained from modeling-compound impressions, I sometimes think that it is the material of preference; but, on the other hand, I have seen equally good results from plaster impressions. The surface obtained from the modeling-compound impression is one factor against it, and I might also mention its tendency to displace the soft tissues. If we follow the Green method, we avoid this latter drawback to some extent. If, after the impression is put into place and the tissues pressed are displaced, the impression is then removed, its surface resoftened and put back, we get a more nearly uniform pressure. There is no one who can form or shape the modeling compound so that it will press uniformly on the surface; so there is undoubtedly a tendency to displacement of the alveolar ridge in a labial or buccal direction in soft mouths. We all have seen plates inserted in mouths without any attention being paid to this feature, plates made on casts obtained from modeling-compound impressions, in which the soft tissues have been pressed to the outside of the ridge.

I am not prepared to say that plaster is ideal. I have not said so in the paper, but within the range of my own experience, I have found it more satisfactory than modeling compound.

With regard to the case about which Dr. Hillyer asked, I cannot tell him exactly what happened. That was a college clinic case, and we had several of them about the same time. Whether this was one from which the tissue was removed previous to the insertion of the plate, I do not know, but I remember one case that was treated successfully in that way. The tissue was cocainized, and removed, and the seam stitched up, and after healing, the plate was made, with, I assume, satisfactory results. In another case, I remember, the impression was first taken with modeling compound in order that the tissues might be pressed out, and then a little coat of plaster was put over the modeling compound and the impression carried to place again in order to secure a better surface by the plaster. That plan I have frequently employed, and I think it extremely useful in a great many cases, for example when there is practically no alveolar ridge, the mouth very soft, and a great bulk of soft and flaccid tissue around the outer border of the proposed plate. In such cases I have taken the impression with modeling compound first, pressing out these tissues, and then giving the impression a coating of plaster in order to get a better impression of the surface. This pressing out allows these tissues to come down, hug the margins of the denture, exclude the air, and satisfactory adhesion results. In this connection, I

am sorry that I was not able to bring with me the lantern slide of a denture worn by Dr. John Allen. I never saw the denture, but the gentleman who had the model did, and some of you may have seen it. The gentleman who had the model told me that he had had the denture in his hands, and that it weighed five ounces; in the center of the denture was a very small vacuum chamber, and to think that that supported the weight of the plate is absurd. The retention of the denture was effected by the apposition of the tissues around the outside contours.

In concluding let me reply to Dr. Hillyer's comment upon the compressibility and unreliability of plaster of which the cast is composed, after we have taken all these precautions to insure an accurate adjustment of the denture. I am in accord with Dr. Hillyer that even the best plaster procurable is subject to that difficulty. Dr. Wilson and Dr. Prothero have conducted experiments showing the degree of compressibility of various brands of plaster, and since I have come in contact with Dr. Wilson I have used Spence's plaster, and have had satisfactory results therefrom. Two years ago I came across a plaster that was well suited for dental purposes in general, made by mixing coarse builders' plaster and comparatively fine dental plaster. It had the even surface desirable, and also set reasonably soon, viz, within from twenty to twenty-five minutes, and was very hard indeed. One could almost throw the cast around the room without breaking it. While I never experimented with this plaster with regard to its compressibility, I have assumed that it was slightly compressible, and so I discarded it in favor of Spence's plaster compound.

Dr. GAYLORD. Will you explain how the plaster compound is removed from the plate after vulcanization?

Dr. TURNER. That of course is covered with tin foil first, which keeps it from sticking to the plate, and then it has to be picked out, which is the only way in which it can be removed.

In conclusion, let me again express my pleasure at being your guest here, and say again how much I have enjoyed meeting with you.

The next order of business was the reading of a paper by Dr. J. LEON WILLIAMS, London, England, entitled, "Tooth Forms in Relation to Facial Contour."

The meeting then adjourned until the evening session.

(To be continued.)

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PHILADELPHIA, AUGUST 1914.

EDITORIAL DEPARTMENT.

WHAT IS THE MATTER WITH "THE COLLEGES"?

THOSE who manage to maintain a reasonable degree of familiarity with the periodical literature of dentistry cannot fail to be impressed with the allusions and charges, both veiled and direct, relating to the shortcomings of "the colleges" in the conduct of their educational work. In the "good old days" when dentistry was essentially a mechanic art, the period of carved block work and wooden doweled "pivot teeth," when roots were "fangs" and pus was a "secretion," and while the apprentice system still maintained its hold on the college curriculum to the extent that each student had likewise his preceptor, "the colleges" were more or less under fire because they taught too much "theory" and were not practical enough. The advice given to the student by his preceptor was, "Go to college to get your theory and your doctor title; but when you accomplish that, come back to my laboratory

and I'll teach you the 'practical' side of your work and make a real dentist of you."

Too much theory and not enough of the practical constituted the burden of the earlier criticism of "the colleges." Later, in the fight against charlatanism, when dentistry, through the efforts of its teachers, its seers, and its ethical benefactors, was growing in stature and dignity toward the status of a self-respecting profession, the objective features of criticism were the laggards in ethical progress, and when the practitioner of ethical instincts and practices had his feelings outraged by the charlatanism or commercialism of some new, though unregenerate, fledgling of the college, he prepared a paper on "How I Fill Root-canals," the peroration of which consisted of a description of how his misguided and advertising competitor didn't fill them at all, and ending with a diatribe against "the colleges" for their unethical teaching, or their lack of ethical teaching, which amounts to the same thing.

Perhaps "the colleges" saw their shortcomings on the ethical question and began to instruct their charges in the technique of traveling in the straight and narrow professional way. At any rate, there is today less of criticism of the colleges for their shortcomings in the matter of ethical teaching. Or perhaps the critical mouth organs of the dental profession have for the time being had their attention diverted to a more immanent and important situation, and have temporarily set aside the ethical question in order to give attention to this to them new revelation of danger, viz, the importance of teaching such things as bacteriology, pathology, and biochemistry to dental students. We now hear that unless the colleges teach these things to their students, dentistry as a profession will inevitably go to the wall.

Just at this point it is interesting to note that bacteriology, pathology, biochemistry, and the like, belong in that category of things that our professional ancestors designated as "theory," using that term as the antithesis of "practical"; *ergo*, we have gotten to a point where more "theory" is demanded as the means of our professional salvation; *ergo* again, we have advanced a peg or two along the pathway of professional progress, for which Heaven be thanked!

But to get back to the main thread of this argument: It is

clear that the demand for more teaching of bacteriology, etc., grows out of the generally spreading recognition of the fact that the mouth is or may become a focus of infection to the rest of the body—a fact that some two decades ago was loudly proclaimed by a dentist, one W. D. Miller, and which a few other dentists recognized and still further emphasized, to a degree that in course of time spread the gospel of mouth infection with so much success that medical men began to pay attention to the matter, and ultimately confirmed the general truth of the proposition. In the meantime, "the colleges," a whole lot of them, undertook to teach and did teach bacteriology, etc., from the mouth standpoint—in view of which fact we are led to make the inquiry that forms the title of this comment, viz, What *is* the matter with "the colleges"?

One thing that is the matter, as we view it, is that much of the criticism of "the colleges" comes from those who graduated under primitive educational conditions in dentistry, and who, measuring the present by standards of the past, know nothing of what "the colleges" are really doing. We take the liberty of reminding all such that the first requisite in the preparation of a formal communication or criticism is a knowledge of the existing status of the object of critical study. But in order that criticism of "the colleges" may be helpful and stimulative, and above all that the truth shall prevail, would it not be well to invite some capable and responsible authority recognized as such by the dental profession to carefully and critically investigate "the colleges," and report officially to the dental profession just what "the colleges" are doing and what they ought to do? It cannot be doubted that much good would follow—not the least of which would be the putting of a quietus upon the criticisms of the type of critic who criticizes the wrong things that do not exist or the absence of right things that do exist.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, January 31, 1914.]

ANESTHESIA OF THE DENTIN. By Zahnarzt Lichtwitz, Guben.

After an instructive review of the many methods which have been suggested and abandoned, and those still in vogue for the desensitization of hypersensitive dentin, the writer enumerates the following conditions for a satisfactory dentinal anesthetic: It must not injure the pulp or the solid constituents of the tooth; it must not discolor the tooth; be applicable with ease, and absolutely efficient; it must not injure the soft tissues if brought into contact therewith; its action must be permanent. Moreover, it is desirable that its application require a short time, call for no special precautionary measures or special instruments, and that its price be low. While fulfilling some of these conditions, silver nitrate is not fully satisfactory. All the conditions enumerated, however, are fulfilled by the silver preparation albargin, which is a combination of silver nitrate with gelatose, and is conveniently applied with a double-headed ball and spatula burnisher. It can be satisfactorily applied in hyperesthesia of the dentin at the cervical margin with incipient caries, in erosions, in hypersensitive dentin which is to be excavated in cavity preparation, in grinding teeth for crown and bridge work, in hypersensitive dentin which for some reason or other is not to be excavated, in hypersensitivity due to close bite or attrition, in carious deciduous teeth in children, in aphthæ and all inflammatory conditions in which silver nitrate is indicated. A fragment of an albargin tablet is pressed upon the hypersensitive field of operation, where it is left adhering for the desired length of time. To prevent its dissolution, the field is kept dry. If desirable, a solution of any suitable strength can be made with distilled water. It is rarely necessary, according to the writer, to prolong the application beyond a period of five minutes, or to repeat the application. He also observed that after a single application of albargin, caries in deciduous teeth had not progressed further in two years, and that hyperesthesia of the dentin at the cervical margin had not returned after the same period of time. In other cases, however, the effect lasted only for one year. Hardly any discoloration was noticeable. In excavating hypersensitive cavities or in grinding down teeth, the effect of albargin is always more prolonged than that of phenol, cocain, perhydrol, or any other medicaments.

In summing up, Lichtwitz unconditionally advocates the use of albargin instead of silver nitrate, emphasizing its effectiveness, convenient and harmless applicability, and absence of discoloration.

[*Journal of the American Medical Association*, Chicago, April 4, 1914.]

DEATHS FOLLOWING ANESTHESIA. Editorial.

When, in discussing the merits of nitrous oxid and oxygen anesthesia before a dental meeting, one of the discussers cited the death statistics which appeared in the *New York Medical Journal*, January 24, 1914, in an article written by Dr. A. H. Miller, and abstracted in the Dental Cosmos, May 1914, p. 629, a mild flurry was created, and exaggeration was either suspected or openly charged. For the fairminded reader and more than happy-go-lucky user of nitrous oxid and oxygen anesthesia, the following editorial from the *Journal of the American Medical Association* gives ample food for thought:

"Progressive medicine recognizes that among the most helpful aids to the advancement of the work of our profession are the critical analysis of errors, either in diagnosis or treatment, the frank discussion of

mistakes, and the unremitting investigation of the reasons why procedures in current practice fail. For this reason we are interested in a recent review of inquests in England concerning deaths during anesthesia for the years 1910 to 1913, especially because it attracts attention to 'the number of fatalities occurring with melancholy regularity' in different parts of the country. From the lay press accounts of coroner's inquests, Flemming, whose paper on 'A Review of Inquests Concerning Deaths During Anesthesia, 1910 to 1913,' appeared in the *Proceedings of the Royal Society of Medicine* 1914, vol. vii, Section of Anesthetics, p. 17, has secured 'only such portion of the pabulum as has managed to squeeze through the newspaper filter.' The statistics are therefore far from complete, and the nature of the anesthetic used has been ascertained in only 542 of the 700 deaths reported in connection with anesthesia. In no fewer than 521 instances among these, the anesthetic seems to have been more or less responsible for death. From such uncertain data it is not easy to determine the proper share of blame which should be attributed to surgery; but in 223 cases death is reported to have occurred before the operation was begun. Included in 100 instances where surgery was distinctly a contributing factor were many operations of great severity and of long duration. These accidents are in a large measure unavoidable, inasmuch as various surgeons must naturally differ in their capacity for combining rapidity with gentleness.

"The statistics regarding the nature of the anesthetics used in the fatal cases reported are instructive: Chloroform, 378. Ether, 28. C. E., A. C. E. and A. C. mixtures, 100. Nitrous oxid, 12. Ethyl chlorid, 6. Spinal, 8. Scopolamin, 2. Hedonal, 2. Local, 6. Not specified, 158.

"In the majority of cases the range in age was from twenty-six to sixty (338 persons) and from six to fifteen (124 persons).

"To American practitioners, less committed than their British colleagues to the general use of chloroform, the apparent dominance of fatalities from this anesthetic at once contrasts with the notably lower figures for deaths under ether. The data cannot be interpreted thus rigidly, however, unless the relative frequency of the use of these anesthetics is likewise known. It may be that the percentage of fatalities is far greater with some other anesthetics than with chloroform. Flemming believes that a large number of these accidents would not have occurred if ether had been used during the induction of anesthesia, or at any rate during the struggling stage, and he champions the use of ether whenever possible. We have no desire to open the old controversy here; but these appalling data cannot be dismissed without awakening some inquiries. Are they attributable to the indiscreet selection of the anesthetic or to the limited experience of the anesthetist? Does the false sense of security point to some deficiency in the practical part of our teaching system?

"We are well aware that from a strictly scientific point of view statistics such as Dr. Flemming has gathered by indirect methods are of limited value. It has even been maintained that the publication of such fatalities is a mistake; that the public is apt to conclude, not that an experienced anesthetist is necessary, but that one who takes an anesthetic is likely to die. They do not realize that many of the accidents are preventable. Whether or not we take the review of Flemming seriously in its bearing on the practice of anesthesia, at any rate it serves to bring out the pressing need of reliable statistics and certain reforms in relation to deaths from anesthetics. If, as has been claimed, the coroner's inquest or the customary reports of death are poorly calculated to bring out the truth, some device ought to be introduced to establish the facts so that any needed reforms can be based thereon. Unpleasant details frequently arouse a storm of protest; but when the atmosphere has cleared, the ultimate outcome is frequently of decided benefit to all concerned."

[*Odontologisk Tidskrift*, Stockholm, No. 2, 1914.]

RESECTION OF THE ROOT-APEX. BY E. BECKER.

In all cases of severe pericementitis in which therapeutic methods of a conservative nature prove unsuccessful, and in many cases, in which the patients cannot, for social or economic reasons, return for many repeated treatments, resection of the root-apex is indicated. For the purpose of certain diagnosis, a

radiograph is indispensable. The technique employed by Becker is that indicated by Partsch, consisting in raising a semicircular mucoperiosteal flap, reflecting it, cutting off the root-end with a bur, removing all granulations with a sharp spoon, and finally smoothing the interior of the alvéolus with a large round bur. The use of a chisel is not recommended by the writer. Even if one-third of the root has to be amputated, the teeth, as experience has shown, will become firm again and useful. The root-canal is filled, preferably before the operation, with an ivory point, making sure that the root portion which is to remain *in situ* is perfectly filled. If at all feasible, the flap is accurately sutured, which aids healing by first intention. If suppuration sets in, it is an easy matter to sever the suture and treat the wound by tamponing. No bone filling is necessary, since the cavity fills with blood, which is organized into connective and subsequently into osseous tissue, as the writer shows by several excellent radiographs. For cementing the ivory point into the root-canal, a paste, consisting of three parts of cement and one part of iodoform, is employed.

If, in the course of a resection, it is found that the root-canal filling is unsatisfactory, this may be corrected from the alveolus. In such cases it is advisable to tampon the wound instead of suturing. If the nasal cavity or the maxillary sinus is entered accidentally, all probing or washing is to be omitted. If the aperture is small, it is sutured; if large, covered with the mucoperiosteal flap, which is fixed in this position by tampons.

[*L'Odontologie*, Paris, March 15, 1914.]

A DENTAL MAGNIFYING GLASS. By H. Léger-Dorez.

While laryngology, obstetrics, and genitourinary science have devised most ingenious appliances for enlarging their respective fields of vision, dentistry, the writer claims, is considerably behind the times in regard to illuminating and magnifying its field of operation. He presents a device which he fittingly terms *Le Pluvoyant*, or megascope, as we might translate this term, consisting of a lens magnifying four times, attachable to the handle of a plane mirror, and adjustable to any position by means of a series of articulating joints. It is easily manipulated with one hand, and does not interfere in any way with the other or operating hand. The quadruple magnification which this instrument affords is very valuable in the examination of discolored or suspect portions of a tooth or mucous membrane, detection of exposed pulps, finding of root-canals, control of the progress of filling operations, the tightness of margins, etc.

[*Dental Record*, London, August 1913.]

PORCELAIN WORK ON NON-METALLIC BASES. By A. Dinnis, L.D.S.

Attention is called to the possibilities and advantages of the employment of non-metallic bases in porcelain work. After enumerating the disadvantages of making a porcelain inlay by means of a metal matrix either by the direct or the indirect method, the writer describes a procedure which consists in taking an impression of the cavity in wax, including enough to define the edge and indicate the contour required. Into this, one of the various "synthetic stones" on the market is poured, care being taken to avoid the formation of bubbles during the embedding of the wax by painting some of the material on the pattern with a camel's-hair brush. The model is slowly dried, the wax allowed to melt off, and the model heated to redness. After cooling, the parts of the model likely to interfere with a clear view of the cavity, or with subsequent manipulation, are cut away. This is conveniently done by a large spoon-shaped excavator, cutting in a direction away from the cavity. The fusing of the porcelain in the cavity is then carried on in the ordinary way, as if a metal matrix were being used. When the requisite contour is obtained, the model and porcelain are immersed in concentrated hydrochloric acid for at least two hours, and the softened stone is then removed, great care being taken of the edge of the inlay. If pressed for time, the operator may give the acid freer access to the deeper parts of the model by drilling with a bur. When the surface of the porcelain has been freed from débris by an excavator and a stiff tooth-brush, it is immersed in a soda solution to remove any trace of acid. Some advantages claimed for this method are certainty of accuracy in the fit of the inlay, on account of its adhesion to

the model and the rigidity of the synthetic stone. Less time is needed, as the fitting of the matrix and "trying-in" is done away with. Platinum posts or pins are readily incorporated when desired, being removed with the impression wax.

This method of direct application of porcelain enables one to dispense with the use of platinum foil also in other cases, as, for instance, if it is desired to add porcelain gum around six anterior teeth. The teeth are adjusted to a plaster model, and wax is built up to represent the desired gum. The teeth and wax are then removed and embedded in the investment, which is brought up around the pins to hold the teeth in position, but leaves the labial surface exposed. After a similar procedure to that in case of the inlay, the wax is replaced by porcelain gum. The piece can be mounted in any desired material, plate or vulcanite. Synthetic stone is not essential as an investment; the investments employed in cast gold work or a mixture of equal parts of plaster of Paris and sand may be satisfactorily employed.

[*Zahnaerztliche Rundschau*, Berlin, February 8, 1914.]

CELLULOID DENTURES. BY ZAHNARZT A. MERTENS, THE HAGUE.

In looking for a material which is no more expensive, as easily workable, and free from the defects of vulcanite, the writer dwells upon celluloid, to which he ascribes strongly antiseptic properties, non-irritation to the mucous membrane, and absence of porosity. Commercial celluloid contains only ½ per cent. of cinnabar, but can be colored with entirely bland dyestuffs, and allows of realistic imitation of the color of the natural gingivæ. Celluloid is much lighter and stronger than vulcanite, and can be worked more easily. The reason why celluloid, which some forty years ago was used fairly generally in dental prosthesis, has been abandoned, the writer ascribes to the inferior quality of some of the celluloid then furnished to the dentist, which, especially when hot food was used, retained a disagreeable taste of camphor. With the perfected processes of today, this and other alleged drawbacks have been entirely done away with. Insufficient solidity of the teeth or warping of the plate is due to heating and pressing the celluloid in moist heat, or exposing it to an excessive temperature, which, moreover, renders the material brittle. If dry heat of from 130° to 140° C. is employed, the plates will not warp, and the teeth cannot be broken off. The brown spots which have been noted in celluloid plates are due to a decomposition of the cinnabar. This can be prevented by painting the finished plate with a thin coat of colorless celluloid dissolved in acetone, which dries quickly and protects the cinnabar against the effect of the saliva.

The procedure of making a celluloid plate is very much the same as that for a vulcanite plate. After separating the flask, and boiling out the wax, a layer of plaster, one millimeter thick, is cut away all around the model, tapering toward the rim of the flask to three millimeters' thickness, to serve as a vent. All traces of wax are washed out with boiling soda-water, and the halves of the flask are dried for one hour. A piece of celluloid which has been shaped with a saw to approximate the shape of the prospective plate is laid over the lower half of the flask which contains the teeth; the upper half is brought to place, and the screws are slightly and slowly tightened, care being taken not to have the temperature of the flask over 130° C. The slightly closed flask is then introduced into the celluloid pot fitted with a thermometer and a temperature regulator, as generally used in incubators, set to 130° C. The celluloid becomes plastic at from 120° to 130° C., and as soon as the flask has reached this point, the bolts are evenly tightened. If resistance is felt, the heating process is continued for a few minutes, and the alternate tightening of the flask and heating is continued until the flask is entirely closed. After leaving the closed flask in the pot for ten additional minutes, the case is removed from the flask, and finished like a vulcanite piece. In polishing, the plate must be kept amply wet in order to prevent warping. Instead of felt cones, the plate may be polished with sandpaper, and the surface rendered smooth by applying a coat of colorless celluloid dissolved in acetone.

Repairs of celluloid plates are made in almost the same manner as those of vulcanite plates. After boiling out the wax,

the case must be thoroughly dried so that no more water vapor is formed, avoiding, however, any heating above 130° C. The complete dryness of the plaster can be controlled by holding a mirror over it; if no water vapor condenses on its surface, the plaster is dry. The places where new celluloid is to be added are coated with spirit of camphor, and a piece of celluloid, slightly larger than the portion to be replaced, is laid over it. The closing of the flask is accomplished in the manner described.

[*La Stomatologia, Milan,* March 22, 1914.]

A CASE OF CONGENITAL ABSENCE OF SALIVARY AND LACRIMAL SECRETION. By Professor G. Fasoli.

Fasoli reports a curious case, the history of which is as follows: The patient, when first seen several years ago, was a girl of ten years, of healthy parentage, and had exhibited in infancy continually dry and chapped lips. The deciduous teeth had erupted without salivation, and were of a yellow-brown color, dry, and greatly carious. The oral mucosa was edematous, with small abscesses, and all the teeth were affected with pericementitis, so that several of them had been extracted in the third year. The permanent teeth had erupted at the normal periods, but showed softness and brownish-black discoloration, and had undergone such rapid disintegration that removal of the roots had become necessary. Examination disclosed moderate anemia, remarkable dryness of the lips, which were covered with hard scabs, and a dry, rough tongue. There was hardly enough saliva to make the mucosa assume a moist shimmer, and even by chemical stimulation not enough saliva could be collected to allow of chemical analysis. Stenson's duct seemed normal, the radiograph also showed a negative finding. Smell and taste were normal. The lacrimal secretion was just sufficient to dampen the conjunctiva, and instead of crying, a vascular hyperemia of the face combined with convulsions of the facial muscles was noted. The eyes were normal, the lacrimal ducts unobstructed. Ammonia failed to produce tears. The orbital portion of the lacrimal gland was missing, the nasal and pharyngeal mucosa normal. Bacteriological examination showed the flora of the mouth to be normal, except that the absence of saliva provided the vital conditions and favored the destructive activity of bacteria.

Fasoli cites the few cases of this kind which have been reported in literature, but contrary to the opinions of the writers cited, he regards this case as one of glandular atrophy. He emphasizes the poor condition of the teeth, which allows of important conclusions in regard to the relationship between dental caries and saliva.

The therapeutic measures adopted in the present case consisted in extraction of the carious teeth and roots, and insertion of artificial dentures when the patient had reached the age of eighteen. The excellent illustrations, showing the patient's profile, plaster casts of the upper and lower jaws, two lower first molars with crowns destroyed by caries, and a radiograph of the maxillæ, reveal nothing abnormal.

[*Deutsche Zahnaerztliche Wochenschrift,* Berlin, January 24, 1914.]

CURIOUS DISCOLORATIONS IN TEETH. By Zahnarzt Weidner, Cologne.

Curious discolorations, chiefly on the buccal or labial surfaces of anterior teeth, giving the impression as if graphite had been intentionally applied, have been observed by the writer in well-cared-for mouths. These discolorations, resembling a deposit, occur most frequently on the labial surface of upper canines, in the left more frequently than in the right; then follow in sequence of frequency the lower left canine, the upper incisors and bicuspids, the lower right canine, rarely the buccal surface of the upper first molar, and the labial surfaces of the lower incisors. These discolorations rarely reach to the gingival margin, and are of a dull luster. It is significant that they have never been observed in unhygienic mouths. From this it became evident that the use of dentifrices and the manner in which most right-handed people use the tooth-brush must in some way be connected with this phenomenon.

In all the cases which were examined, the use of a tooth-paste was habitual. As the pastes could not be incriminated, a search revealed the fact that many tooth-paste tubes, which are supposed to be made of pure tin, are either contaminated with lead, or are made of lead coated with tin. In this find-

ing the writer is corroborated by the *Zeitschrift des Allgemeinen Oesterreichischen Apotheker-Vereins* (for 1913, p. 630), which states that in Austria some "tin" tubes contain up to 90 per cent. lead. The writer fitly remarks that, if these findings are correct, there is great danger of lead intoxication, and his plea for a thorough investigation of this matter seems deserving of full indorsement.

PERISCOPE.

Preventing Polished Metal Surfaces from Sliding.—A piece of paper placed between finished metal surfaces keeps them from sliding.—*Popular Mechanics.*

Gutta-percha for Durable Temporary Fillings.—A temporary gutta-percha seal may be made to last longer by filling the last part of the cavity with base-plate rubber. Cavities which are too sensitive to tolerate the greater heat necessary to make base-plate rubber plastic may be filled in this way, and when they do not receive the direct force of mastication, these fillings give better service than most other temporary work.—H. C. FITZHARDINGE, *Commonwealth Dental Review.*

Daily Cleansing of Metal Dentures.—For the daily cleansing of metal plates, the following mixture is recommended: Oxid of magnesium and tartar āā 1 gram; kaolin and oxid of zinc āā 3 grams; chalk 4 grams. The plate is rubbed with a pledget of cotton dipped in this mixture and then rinsed in water. Before returning to the mouth, the plate is brushed with a tooth-brush dipped in a solution of one teaspoonful each of sodium bicarbonate and alcohol in one-third liter of water, which is also a good mouth-wash.—*Zahnaerztliche Rundschau.*

Preserving Pure Mercury.—Mercury is found in nature either pure or in combination with sulfur—cinnabar. Ordinary commercial mercury is generally alloyed with small quantities of lead, tin, etc. For dental purposes, only electrically purified mercury should be used; other brands are never chemically pure and exert an untoward influence upon the amalgamation of metals and color of amalgam fillings. If preserved in a glass bottle under alcohol, mercury remains permanently pure and bright. If the bottle is reversed, only mercury flows out, the alcohol remaining above the heavier metal. —*Der Dental-Markt.*

Alteration of Alkaloidal Solutions by Sterilization.—Tropacocain, beta-eucain, and novocain are quite stable. Cocain hydrochlorid shows considerable dissociation at higher temperatures and on tyndalization, but at 100° C. the amount of decomposition is practically negligible; it does not exceed 2.3 per cent. of the total salt present when boiled at 100° C. in ordinary glass vessels. Stovain also shows some decomposition, but like cocain it does not dissociate sufficiently to prevent its solutions being sterilized at 100° C. Alypin salts are very sensitive to the action of heat, and cannot be sterilized by boiling.—G. MOSSLER, *Apoth. Zeit.*, per *British Dental Journal.*

A Spiked Band for Bottles containing Poison.—The safety-first campaign which is being urged on every hand finds a quick response in devices to make accidental mistakes in handling poisonous substances less frequent, if not impossible. One poison signal consists in a rubber band, armed with small rubber spikes projecting from it, and placed about bottles, round or square boxes, or packages in which poisonous substances are offered for sale or distribution, giving an unmistakable warning to any person picking up or handling it. The band is very flexible, and there is sufficient elasticity in the rubber of which it is made to allow it to be placed about bottles of various sizes and shapes.—*Popular Mechanics.*

Influence of Drawing on the Properties of Metallurgical Products.—L. Guillet has studied the effect of cold work on the mechanical properties and the resistance of metals and alloys to corrosion. Drawing greatly increases the elastic limit and decreases the resilience. Elongation is diminished to a greater extent than the contraction. Experiments have been made on the resistance of aluminum and some of its alloys to corrosion in water and different

saline solutions of various strengths. Although in a great many cases the cold-worked product is attacked to a greater degree than the annealed product, this is by no means a general law. The action appears to be a function of the alloy and the acting reagent. —*Revue de Métallurgie*, per *British Dental Journal.*

The Use of Floss Silk in Daily Dental Toilet.—There is no doubt that floss silk is the most efficient agent, if properly used, for cleansing the lower anterior teeth and preventing the accumulation of tartar at that point. For its proper and effective use I have for many years been teaching my patients the following simple method, which if followed has proved entirely satisfactory: The thread is passed entirely around the tooth, the ends are crossed, and drawn tight, and first one end and then the other is pulled, thus wiping the entire circumference of the tooth. Each tooth is treated separately, at first before a mirror until the user is familiar with the operation. When giving my patient the first lesson I use a black thread, so that the procedure may be seen more easily.—D. W. BARKER, *Oral Hygiene.*

Relieving Pulp Pain in Pyorrhea Alveolaris.—If a pyorrhea has been of rapid progress, no matter whether it has progressed uniformly or in deep pockets, one may expect to find pathological forms of deposits in the pulp. The rapidity of the disease in any form in people past thirty years of age determines largely the extent and variety of pain attending the deposits, which is usually described as neuralgic, shooting, darting, itching, etc. In many cases where there is a heavy salivary deposit covering most of the tooth surface above the gum, with no previous history of pain in the pulp, soon after the teeth are thoroughly scaled and large surfaces of the roots exposed to thermal changes the patient will complain of pain in the pulp, which may be relieved in some cases by the use of silver nitrate, though in many such cases it is necessary to remove the pulp.—W. O. TALBOT, *Dental Brief.*

Anesthesia in Acute Inflammations of the Mouth and Pharynx.—T. B. Layton warns against the use of a general anesthetic in cases of quinsy, peritonsillar abscess, retropharyngeal abscess, and diffuse cellulitis in the fascial planes of the neck and floor of the mouth, and says that most of these can be cared for without any anesthetic or with local anesthesia. The danger of inspiration of septic material and of severe cyanosis is too great under a general anesthetic to warrant its use except in the rarest cases. Most abscesses associated with the teeth may be operated upon under nitrous oxid anesthesia. Layton expresses it as his belief that the diffuse cellulitis of the neck and floor of the mouth and the large, deep-seated abscesses of the neck in relation to the pharynx, larynx, and carotid vessels are due to the teeth, and are further stages of the abscesses internal to the lower jaw.—*Lancet*, per *Journ. Amer. Med. Association.*

Asymmetry in the Eruption of the Deciduous Teeth.—A. Beretta contends that there exists an asymmetry in the eruption and probably also in the formation of the deciduous teeth. This asymmetry, according to him, exists in 54 per cent. of all cases, in favor of the right side in 46 per cent., in favor of the left side in 8 per cent. of these cases. Moreover, in a great many cases examined in which the dental formula seemed symmetrical, the teeth, according to the mothers' assertions, erupted earlier on the right side.

Many of the children who exhibited an asymmetry in favor of the left side showed marked symptoms of left-handedness, and it could be ascertained that the father or the mother or both were left-handed, or at least ambidextrous. Hence there seems to be an evident relationship between asymmetrical dental eruption and right- or left-handedness, due undoubtedly to an asymmetry in the central nervous system.—*Neurol. Centralblatt*, per *Journ. Dentaire Belge.*

Cleft Palate and Hare-lip.—The communication from which this abstract is made issues from the University clinic at Berlin, in charge of Bier; it is profusely illustrated; 212 bibliographic references are appended. Both early intervention and the Brophy technique are discussed in particular, Kaerger stating his preference for the technique used at the clinic, which differs from Brophy's especially in that the alveolar processes are not separated and their position changed. He emphasizes the importance of co-operative supervision from birth onward, by pediatrist and surgeon, of children with these deformities, until they have been finally and completely corrected, and approximately normal conditions restored. The surgeon should determine the indications for intervention at the earliest possible moment compatible with the development of the child and its condition as regards nourishment and growth; the various steps of the intervention should be guided according to these indications.—E. KAERGER, *Archiv f. Klinische Chirurgie*, per *Journ. Amer. Med. Association.*

Ligating a Tooth Luxated Accidentally in Extracting.—An accidentally loosened tooth is ligated to its neighbors by a silk or wire ligature. The writer preferably employs Angle's regulating wire, as a metallic thread is not affected by the buccal secretions and food as is silk or cotton.

The best ligature for this purpose is made by including the luxated tooth and those teeth which are to support it in a wire cap twisted fairly tight. Then another wire is passed between each interproximal space, facio-lingually under the first loop, and brought out linguo-facially over it. This interproximal loop is drawn tight; thus a small loop is passed under and over the ligature, holding all the teeth between each interproximal space. After all interproximal spaces are wired, the original or large loop is drawn tight. The twisted extending portions are doubled-up into the interproximal spaces, so that the lips are not traumatized. They must not extend too far lingually or they will injure the tongue. This is practically a Hammond splint. A few days' immobilization will usually restore these teeth to normal health, unless the pulp is affected, and then the treatment consists of course in devitalization.—W. J. Lederer, *Dental Outlook.*

Diagnosis of Pulp Hypertrophy.—Chronic hyperplastic pulpitis, commonly referred to as pulp polypus or hypertrophy of the pulp, is caused by the continuous irritation of the parenchymatous structure of the pulp by the rough edges of the perforated pulp chamber. From a pathological point of view, the newgrowth should be looked upon as a neoplasm of the granulomatous type. These little tumors, being composed of dense connective tissue, usually spread over the entire cavity; they are principally found in the bicuspids and molars. Hyperplastic pulp tissue is practically free from nerve elements but rich in bloodvessels. Consequently they do not react painfully on being irritated, but they bleed very freely. Apparently they inconvenience the patient but little. These neoplasms are more or less pedunculated, the stem being rather short. The pulp itself is almost always found in a high state of chronic inflammation, and extremely sensitive to the touch. In diagnosing these newgrowths, care should be exercised in not confusing them with hypertrophic gum tissue, which may have grown into the cavity. From the above description the diagnosis of a chronic hyperplastic pulpitis is a comparatively simple procedure.—H. Prinz, *Dental Summary.*

Technique of Making Pattern for Cast Gold Inlay.—The place where failures in inlays occur most frequently is at the gingival margin. This is a hidden part of the cavity, and is very easily overlooked. The wax pattern should be removed immediately after the first pressure, to examine the adaptation. Should the impression of the gingival margin of the cavity be faint or imperfect, a softer wax, such as Solbrig's plate wax, should be melted on at such point, and another pressure made. A perfect impression of the gingival margin is absolutely essential, and there is no need of continuing the work beyond this point unless this has been obtained. Cavities must be prepared so that the wax will be forced upon the gingival wall with an equal pressure to that made upon the other parts of the cavity. The patient should be requested to bite upon the wax to give the proper occlusion, and the wax trimmed and burnished to the desired contour. A silk ligature passed between the contact point and along the gingival margin helps in trimming off the surplus, and also aids in removing the pattern by cutting away a small portion of the contact point.—E. D. Coolidge, *Western Dental Journal.*

Postanesthetic Administration of Glucose.—Anesthesia causes a sudden drain on the reserve supply of glycogen in the system. If the patient be not suitably fed, he begins to live at the expense of reserve fats and to some extent proteins. These are imperfectly oxidized, and the intermediate products resulting from incomplete oxidation are toxic. The liver, upon which develops the task of neutralizing these toxic substances, is in a state of general functional inferiority owing to the lack of glycogen. From this the authors conclude that, in order to combat postanesthetic intoxications, carbohydrates must be supplied to the organism, both for prophylactic and curative purposes. Glucose—grape sugar—which is directly absorbable, is the food of choice for operated individuals. In order to facilitate its ingestion in sufficient amount, the following combination is prescribed by the authors:

℞—Glucose,	150 gm. or ℥v.
Tincture of nux vomica,	0.5 gm., or ♏viij.
Tincture of cinnamon,	3 gm., ♏l.
Water, enough to make	300 cc., ℥x. M.

This is to be taken in dessertspoonful doses every half-hour. Vomiting is not only not induced, but is arrested by this solution. Where toxic disturbances have already appeared, glucose should be given freely by all

routes—orally, rectally, and even intravenously. Alkalis should also be administered, in conformity with the prevailing practice in diabetic coma.—CHAUVIN and ŒCONOMOS, *Tribune Medicale*, per *Monthly Cyclopedia and Med. Bulletin.*

Dentition and Growth of Hair Under Control of Internal Secretions.—Josefson presents evidence, clinical and roentgenoscopic, which reaffirms anew the correctness of Woods Hutchinson's recent paraphrase—"We are such stuff as ductless glands are made of, and our little life is rounded by a sheep." Josefson advocates systematic organ therapy during pregnancy in families which manifest a family tendency to abnormal dentition and growth of hair. Tardy dentition should be regarded as a warning that the development of the body is not progressing as it should, and that the work of the glands with an internal secretion will have to be artificially supplemented to tide the patient along until normal conditions become installed. He does not attribute the trouble to any one gland, but to some disturbance in the functional balance of the whole ductless-gland system. Dentition was hastened and regulated by thyroid treatment in a boy of fourteen, backward in intelligence and physical growth. Numerous anomalies and delayed development were found in the teeth of a woman of twenty-seven with myxedema since puberty. Three children in one family have numerous anomalies in dentition and growth of hair, and similar anomalies had been recorded in two preceding generations on the mother's side. Thyroid treatment of one of the children apparently had an important influence in stimulating and regulating the further growth of teeth, genitals, and hair.—A. JOSEFSON, *Hygeia*, per *Journal of Amer. Med. Association.*

How to Determine the Cleanliness of Root-canals.—It is of utmost importance that root-canals be thoroughly freed of all matter contained in them.

The average dentist will clean out a canal to his satisfaction, and test for smell. But these procedures are very insufficient and many a time misleading; there is always likely to be a groove in the canal in which is lodged some particle of the decomposed pulp. This is usually very difficult to extract from the canal. But, on the other hand, if we have a method which would insure the cleanliness of root-canals, we could gradually mummify the remains in the canal through medicinal agents, and in this manner bring about a state of cleanliness. In the following a method of procedure is suggested: To a broach, which may be either barbed or smooth, is attached a pellet of cotton, dipped into hydrogen dioxid solution, and the broach is introduced into the canal, leaving it there for about thirty seconds. The broach is removed with the cotton still on it, and dipped into a receptacle, which must be perfectly clean, also containing hydrogen dioxid. If bubbles form, the canal is not clean. When the broach with the pellet of cotton containing the H_2O_2 was introduced into the canal the H_2O_2 immediately dissolved the organic matter, which in turn was taken up by the cotton on the broach. Thus upon placing the broach into the receptacle containing the H_2O_2 a froth is produced. If after several applications the formation of the froth has been eliminated, the canal has reached a state of cleanliness and is ready to be filled with the proper materials.—J. A. KLEIN, *The Acorn.*

Teeth, Hair, and Ductless Glands.—The ductless glands have been held responsible for so many functions in recent years that one hesitates to add to their share of the responsibility for the proper performance of physiologic activities. Nevertheless, new suggestions of possible influences exerted by the organs of internal secretion are still frequently being brought to the attention of scientific observers. Dr. Arnold Josefson of Stockholm (see "Dentition," etc., on this page) has sought to defend the thesis that dentition and the early development of the hair are under the dominance of some of the ductless glands. In general, his argument centers in the fact that disturbances in the normal development of the teeth and the appearance of hair on the body are associated in many cases with known defects in the behavior of some of the glands of internal secretion, and that the anomalies can be corrected in some cases by suitable organotherapy. There is nothing fundamentally new in this doctrine. It has long been maintained that the thyroid and hypophysis, for instance, exhibit what has been interpreted as a functional hypertrophy during pregnancy. It is not at all unbelievable that, if these maternal glands fail to contribute a due share of the determinative products during this developmental period, the embryo may suffer in its correlative growth. Serious irregularities in the dentition or the appearance of hair in the young may become the expression of some defect in the glands like the pituitary or the thyroid which, if understood, may be remediable by administration of preparations of the corresponding tissues. Josefson has

furnished clinical illustrations of the simultaneous occurrence of delayed dentition and persistence of fetal hair which could be corrected by administration of thyroid extract. Abnormal dentition is common in infantile myxedema, and has likewise been improved by thyroid therapy. Hypertrichosis has frequently been observed in connection with rapid development of the several glands. The interrelations thus brought out raise the question whether organotherapy may not have an unexpected field of usefulness during the pregnancy of mothers in whom the family history warrants the suspicion of possible hereditary defect in the offspring.—*"Current Comment," Journ. Amer. Med. Association.*

A Method of Closing a Sinus Between the Antrum of Highmore and the Mouth.—While several methods for this operation are in vogue, the writer prefers the one described in the following, which has been successful in 95 per cent. of the cases treated. The method advocated is as follows: After completing the Denker operation and being sure that there is excellent drainage into the nose, the alveolar process is attacked. After removing the necrotic bone completely, enough of the inner and outer lamellæ of the alveolar process is removed to allow of perfect apposition of the flaps, that have been previously lifted from its inner and outer surface. These flaps must come nicely together, so that it is not necessary to have any tension on the sutures. Along the inner and outer surfaces of the alveolar process at this point is placed a piece of small rubber tube sufficiently long to allow it to be tucked underneath all the sutures; then, using double-armed silkworm-gut sutures, a sufficient number are introduced from within out, the loops resting on the rubber tube on the inner surface of the alveolar process, the knots being tied on the rubber tube on the outer surface of the alveolar process. Care should be exercised to tie the sutures just tight enough, without getting them so tight as to produce pressure necrosis of the flap. These sutures are cleansed hourly with hydrogen dioxid following the operation. The nurse must be exceedingly careful to clean in and around the sutures and tube thoroughly. If this operation is done at the time of the antrum operation, the incision for the Denker operation is made high up, and is entirely separate from the incision on the border of the alveolar process. The periosteum, from the outer surface, is elevated completely without being torn, and is handled with great care while the necrotic bone is being removed and the inner and outer lamellæ of the alveolar process are being cut down.—L. W. DEAN, *Journ. of Amer. Med. Association.*

The Insertion of Non-cohesive Gold in Cavities.—As the retention of a non-cohesive gold filling depends upon the mechanical arrangement of its parts, and the crowding of the gold into the cavity in such a way as to put the dentin of the tooth upon the stretch, thus bringing into play the grip of the elastic dentin upon the gold, it follows that the forces employed must be such as to expand the mass from the center to the surrounding walls. For this purpose the wedge and the lever are the forces used and the instruments employed are wedge-shaped and strong enough to be used as levers. These principles are exemplified in their perfection in the filling of simple cavities with non-cohesive gold, and in a modified degree only in cavities of the second, third, and fourth classes, whereby but a part of the filling is made of non-cohesive gold.

In filling cavities of the first class with non-cohesive gold, cylinders are placed in the ends of fissures and about the walls, with their long axes perpendicular to the floor of the cavity and their ends protruding from the orifice. Between these are forced other cylinders, crowding those already placed tightly to the walls, and the mass is still further impacted against the walls by wedging a strip, fold by fold, in between the cylinders with a wedge-shaped instrument, using a rocking motion for leverage, and catching and carrying each fold to the bottom of the cavity. This process is continued until no more gold can be forced into the mass, which is then condensed directly toward the floor of the cavity and over the margins, and finally burnished heavily.

The main precaution to be observed in this operation is to see that there is always left an opening in the mass of gold into which the next piece of gold can be wedged, and no attempt should be made to add to a plain surface as in using cohesive gold.

In cavities of the second, third, and fourth classes, the use of non-cohesive gold is confined principally to the gingival third.—H. B. TILESTON, *Plugger.*

Obituary.

DR. GEO. LUCIUS HURD.

Died, March 3, 1914, at Lakeville, Conn., of heart disease, in his fifty-fifth year, George Lucius Hurd, D.D.S.

Dr. G. L. Hurd, whose demise occurred at Lakeville, Conn., on March 3, 1914, was born in South Adams, Mass., on December 14, 1860, as the son of Lucius Francis and Katherine Kellogg Hurd. After receiving his early school education in the grammar and high schools of his native city, he entered the dental pupilage of Dr. S. K. Saunders of Lee, Mass., in 1880. He matriculated in the dental department of the University of Pennsylvania, from which institution he received the degree of D.D.S. in 1885. Taking up the practice of his chosen profession in Lakeville, Conn., he quickly built up a remunerative practice, being interested in all innovations in dentistry, and of an inventive turn of mind. Though forced by ill health to give up practice six years ago, he remained a loyal member of the Dental Alumni Society of the University of Pennsylvania, and of the Connecticut State Dental Association.

In 1882 deceased was married to Miss Grace E. Saunders, who survives him.

The high esteem in which Dr. Hurd was held in the community, is evinced by an *in memoriam* resolution of the Litchfield County University Club, from which we quote: "We would record our high regard for him as a successful member of his chosen profession, as a valued member of this club, as a public-spirited citizen, and as a noble Christian gentleman."

Interment was made at Lee, Mass.

DR. EUGENE W. KNIGHT.

Died, May 5, 1914, at his home in Bellows Falls, Vt., Dr. Eugene W. Knight, in his fifty-first year.

Dr. Knight was born in Marlow, N. H., on September 15, 1863. His parents were Eben P. and Elvira (Richardson) Knight. He attended Marlow Academy and after being graduated removed to Bellows Falls, Vt., to study dentistry with his cousin, Dr. O. M. George. He began practice for himself in New Hampshire in 1884, and had conducted offices in Alstead, Gilsum, and Marlow, N. H., for seven and one-half years before coming to Bellows Falls, Vt., in 1890. At the time of his demise he was the oldest practicing dentist in the town.

Deceased was greatly interested in Masonic activities, and held many high offices in that order. He was a member of the National Dental Association and of the Vermont State Dental Society; he was also an honorary member of the New Hampshire State Dental Society. He was not a member of any religious denomination, but attended the Universalist church.

Dr. Knight had a special aptitude for mechanics, and achieved an enviable reputation as an accomplished dentist. He always felt it keenly that he had not been graduated from a dental college.

Honest and endowed with generous social gifts, he had a wide circle of friends—who, with his family, sincerely mourn his loss.

Deceased is survived by his wife, *née* Alberta S. Lovell of Rockingham, Vt., and two sons, Dr. Leroy E. Knight of Everett, Mass., and Dr. Ralph M. Knight.

DR. WILLIAM F. ENDLICH.

Died, February 26, 1914, in Philadelphia, Pa., William Frederick Endlich, D.D.S., M.D., in his fifty-fifth year.

In the demise of Dr. W. F. Endlich, which we have previously briefly noted in these columns, an indefatigable, interesting, and most successful career has come to a close.

Dr. Endlich, who was born on November 7, 1859, being the son of William and Eva Endlich, was a self-made man in the fullest sense of the word. Leaving home at the tender age of twelve, he first secured employment with the old Delaware, Lehigh, and Easton Canal Co.; then, going to New York

City, he learned the trade of a barber. At seventeen he enlisted in the United States navy on board the U. S. S. Plymouth. With the savings of three years he matriculated in the Pennsylvania College of Dental Surgery, from which institution he was graduated in 1883. Continuing his medical studies, he entered Jefferson Medical College, and was graduated therefrom with the degree of M.D. in 1885.

After practicing both dentisty and medicine for about six years, he devoted his entire energy to dental practice, in which he gained a wide reputation by his application of the electric battery for the purpose of securing painless extraction.

Deceased was married to Miss Annie J. Daniel of Philadelphia, who, together with three children, Dr. Wm. M., Miss Bessie M., and Miss Grace H., survives him.

Interment was made at New Britain, Bucks Co., Pa.

"IN MEMORIAM" RESOLUTIONS.

Dr. Frank L. Sibley.

THE following resolutions of regret were passed at a recent meeting of the Rochester (N. Y.) Dental Society:

Whereas, our beloved member, Dr. FRANK L. SIBLEY, has been removed from us by Divine Providence, it is fitting that we should make a record of his death and express our sorrow over the untimely close of a successful career; and

Whereas, by his genial disposition, estimable character, his skill as a practitioner, and his keen interest in the affairs of this society, he has been a credit to the dental profession; therefore be it

RESOLVED, That we, the members of the Rochester Dental Society, feeling deeply the loss we have sustained, hereby express our appreciation of his friendship, and our sorrow that he will never more meet with us in our social pastimes or professional activities; and be it further

RESOLVED, That these resolutions be spread upon our minutes, and that a copy be sent to the widow, also to the professional journals for publication.

EDGAR F. LEWIS,
FRED M. ROOD,
Committee.

Brief Necrology.

Dr. JOSHUA M. LAMOREAUX of Galesburg, Ill., on May 27, 1914, of angina pectoris.

Dr. FREDERICK W. DARMER of Putnam, Conn., on April 12, 1913, after prolonged illness.

Dr. WM. MITCHELL of Grosvenor Sq., London, Eng., on June 9, 1914, in his sixtieth year, after prolonged illness.

Dr. FRANCES H. MILLER of Brooklyn, N. Y., on May 7, 1914, in her forty-second year. Deceased was a graduate of the Chicago College of Dental Surgery.

Dr. ISAAC N. SHEPPARD of Paris, Ill., on April 25, 1914, of cirrhosis of the liver, in his fifty-second year. Deceased was a graduate of the Indiana Dental College.

Dr. JEROME B. PAINTER of San Francisco, Cal., May 20, 1914, in his fortieth year. Deceased was a graduate of the College of Dentistry, University of California.

Dr. CHAS. H. TILLOTSON of Mattoon, Ill., on April 22, 1914, of diabetes, in his forty-fifth year. Deceased was a graduate of the dental department of the University of Pennsylvania.

Dr. SIDNEY S. STOWELL of Pittsfield, Mass., on May 10, 1914, in an accident, in his fifty-second year. Deceased was a graduate of the dental department of the University of Pennsylvania.

Death of Dr. Geo. Edwin Hunt.

WE much regret to learn of the decease of Dr. GEORGE EDWIN HUNT of Indianapolis, which occurred in that city on July 11th. A biographical notice will be published in our next issue.—ED. COSMOS.

Dental College Commencements.

MARQUETTE UNIVERSITY, SCHOOL OF DENTISTRY.

At the annual commencement exercises of Marquette University, held in Milwaukee, Wis., the degree of Doctor of Dental Surgery was conferred on the following graduates:

H. G. Bach	E. T. Finucan	R. R. Lally	S. Schuhman
A. D. Backus	B. F. Fowler	F. Levenhagen	R. L. Siebecker
A. F. Baumgartner	H. Fryatt	H. I. Lewis	A. C. Sloan
L. B. Bernhardt	G. M. Funne	F. J. Martin	W. C. Southcott
E. L. Bly	G. Galligan	E. W. Nickson	J. W. Sweeney
W. E. Boyle	A. C. Hagen	R. W. Niederer	F. Vater
O. E. Brassington	E. H. Heinrich	R. J. Paradowski	C. M. Walker
G. N. Cohen	S. W. Herthel	L. W. Prescott	W. U. Walls
H. Coyle	A. E. Hess	J. B. O'Hora	W. Weinberger
T. E. Davin	A. G. Jennings	C. H. Ritsch	O. J. Wilda
J. E. Dwyer	W. H. Kelly	L. F. Rundell	G. Wilson
L. D. Elliott	E. A. Keppelar	C. Runge	J. R. Woelffer,
H. E. Elwell	H. Kistler	O. Schlueter	A. J. Zimmer
W. E. English	F. L. Kneip	H. O. Schneiders	

MEDICO-CHIRURGICAL COLLEGE, DEPARTMENT OF DENTISTRY.

The thirty-fourth annual commencement exercises of the Medico-Chirurgical College, Department of Dentistry, were held in the Academy of Music, Philadelphia, Pa., on Friday, June 5, 1914.

The doctorate address was delivered by President John G. Hibben, LL.D., of Princeton University.

The degree of Doctor of Dental Surgery was conferred by Prof. James M. Anders, Ph.D., M.D., LL.D., on the following graduates:

Guillermo T. Acosta	Cuba
K. Aznavoor (H. Sivasly)	Armenia
Narciso Barberena, Jr.	Central America
Martin F. Boland	Pennsylvania
Herman Brownstein	Connecticut
Albert Cartun	Pennsylvania
James C. Corson	New Jersey
Myer Darrow	Pennsylvania
Miguel R. Denegri	South America
Herman Edelman	Pennsylvania
Emmett J. Edmunds	Pennsylvania
Cyril A. Gagion	Pennsylvania
Morris S. Halbmillion	Pennsylvania
Leonard J. Harkins	Pennsylvania
Maurice Harris	Pennsylvania
Richard G. Holton	Massachusetts
Alexander J. Hunter	Pennsylvania
Austin F. Kearney	Pennsylvania
Charles Kellman	Pennsylvania
Charles C. Knepper	Pennsylvania
Edward H. Lace	Pennsylvania
James K. Loewen	Pennsylvania
William L. McCutcheon	Canada
Charles E. Mann	Pennsylvania
John G. Miller	Pennsylvania
Jose D. Mon	Cuba
William J. Morris	Pennsylvania
Francis M. Nealon	Pennsylvania
James J. O'Rourke	New York
Joseph F. O'Connor	Pennsylvania
Abraham N. Obrasky	Pennsylvania
Jose J. Polo	Cuba
Alberto A. Ponce	Cuba
Jacob Reich	New Jersey
Jose D. Ricardo	Cuba
Ralph Schmucker	Pennsylvania
Stanley Shannon	New York
Samuel H. Shapiro	New Jersey
Abraham Shneyer	Pennsylvania
Edward L. Stapleton	Pennsylvania
Arthur Sullo	New York
Solomon Vineburg	Connecticut
Vincenzo DeVirgiliis	Italy
Harry L. Westney	New Jersey
Robert B. Zion	Pennsylvania

THE THOMAS W. EVANS MUSEUM AND DENTAL INSTITUTE SCHOOL OF DENTISTRY UNIVERSITY OF PENNSYLVANIA.

The annual commencement exercises of the Thomas W. Evans Museum and Dental Institute School of Dentistry University of Pennsylvania, were held in the Metropolitan Opera House, Philadelphia, Pa., on Wednesday, June 17, 1914.

An oration was delivered by his Excellency Jean J. Jusserand, LL.D., the French ambassador.

The degree of Doctor of Dental Surgery was conferred by the provost, Edgar F. Smith, Ph.D., Sc.D., LL.D., on the following graduates:

William T. Anderson	New York
Forrest W. Andrew	Massachusetts
Zadok W. Ankrom	West Virginia
Joseph L. Appleton, Jr.	New York
Marcel M. A. Astraud	France
Leroy W. Atwater	New York
Guy F. Axtell	New York
Gerardo M. Baca	Nicaragua, C. A.
Byron W. Barton	New York
Edward J. Beegan	Connecticut
John G. Bell	North Carolina
Culmer C. Benton	Indiana
Milton J. Bermas	New York
Walter H. Bittman	New York
Joseph Blewett, Jr.	Pennsylvania
M. Alejandro Botero	Columbia, S. A.
Charles L. Bouvier	Switzerland
Robert J. Brands, Jr.	New Jersey
Harry J. Brinkman	New Jersey
Kenneth S. Brown	Jamaica, B. W. I.
Wallace W. Bryce	New York
John Burkhardt, Jr.	Pennsylvania
John C. Burr	New York
James R. Cameron	New Zealand
Bruce R. Cardon	Pennsylvania
Thomas F. Carroll	New York
Luis F. Casals	Porto Rico
Thomas W. Caskey	Scotland
George L. Cassel, Jr.	Pennsylvania
Volney W. Chapman	New York
Abraham E. Cocks	New York
Aaron R. Crane	New Jersey
Frank LeR. Crane	New Jersey
William P. Crawford	Pennsylvania
Cornelius T. Cross	New York
Floyd J. Cross	Pennsylvania
Hew Dalrymple	Queensland, Aus.
Charles H. Darrah	Delaware
Ralph S. Davenport	France
Hedley T. S. Donaldson	Victoria, Aus.
Frank E. Dougherty	Pennsylvania
Harrison B. Duncan	New Jersey
Louis A. Eck, Jr.	New Jersey
Roland H. Ellis	New Jersey
Seneca P. Farr	New Jersey
Herbert D. Foote	Queensland, Aus.
George A. Forsyth	Transvaal, S. Africa
Henry M. Fox	Massachusetts
Reginald A. Fox	England
Clinton B. Frawley	New York
Samuel E. Frick, Jr.	Pennsylvania
Robert A. Genet	Switzerland
Roy S. Glass	New York
Bernhard C. Grunewald	New York
Shafeek M. Hanna	Egypt
Maxwell A. Heckler	New York
Joseph T. Hempel	New York
Henri G. Hervochon	France
LeRoy C. Hicks	New York
William H. Hough, Jr.	Connecticut
Henry J. Hudson	N. S. Wales, Aus.
James L. P. Irwin	Missouri
Howard F. James	New York
Rudolf H. Jeanneret	Switzerland
Kenneth C. Johnson	Connecticut
Aubrey W. Jones	N. S. Wales, Aus.
Floyd R. Jones	Connecticut
Philip J. Jones	Connecticut
John F. Kenedy	Massachusetts
Joseph I. Krowitz	New Jersey
Reginald P. Lane	N. S. Wales, Aus.
Jean B. Le Quellec	France
James J. Lewis	Connecticut
John R. Lilliendahl	New York
Lloyd O. Loechel	Pennsylvania
Clarence T. Lugar	New Jersey
James Clarence W. Lutz	New York
John J. McAloon, Jr.	Pennsylvania
Michael J. McCaughley	New York
Leo T. McCawley	Pennsylvania
John C. McElhaney	Pennsylvania
Roswell L. McKim	New York
Albert A. McLaughlin	Connecticut
Juan J. MacCormick	Argentine, S. A.
Kenneth D. MacDonald	Montana
Fred MacNaughton	New York
Paul G. Maier	New York
William H. March	Pennsylvania
Guy C. Marshall	New York
John R. Maxon	New York
James V. Mendillo	Connecticut
Andrew R. Menzies	Queensland, Aus.
Charles P. Merla	New Jersey
Charles T. Miles	Pennsylvania
Dudley R. Miller	New Jersey
Earle L. Miller	New York
Henrique O. Miranda	Brazil, S. A.
Teodoro Miranda, Jr.	Cuba
Harold C. Morgan	Victoria, Aus.
Ralph G. Morris	New Jersey
Sulim Moscovici	Roumania
Alfons Moufang	Germany
Ogden B. Munroe	Illinois
Hermann R. Neithardt	Switzerland
Charles J. Nichols	Connecticut
Edwin W. Nies	New York
Rudolph H. Nissley	Pennsylvania
Fred C. Ogden	New Jersey

William J. Ollayos .... Connecticut
Willis R. Osmun .... New Jersey
Douglas B. Parker .... New York
Russell L. Pellett .... New Jersey
Edward D. Ralph .... New York
Samuel L. Rambo .... Georgia
Martin E. Richards .... Pennsylvania
Francis H. Riley .... Pennsylvania
George H. Riley .... Connecticut
Raymond C. Robinson ...... New Jersey
Arthur C. Roblin .... New York
Harold C. Rose .... New York
Hyman Rosenbaum .... Connecticut
Abraham B. Rosoff .... Connecticut
Arthur G. Rouse, Jr. .... Connecticut
Henry San .... New Jersey
Francisco W. San Lucas ..... Ecuador, S. A.
Jacques J. Schermant .... Austria
Subodh C. Sengupta .... Bengal, India
Reginald A. Slade .... England
Clinton E. Snyder .... New York
Friedrich W. Solbrig .... Germany
George F. Starr .... Connecticut
John A. Stehley .... West Virginia
Egbert C. Steinsieck .... Pennsylvania
Earl O. Stevens .... Ohio
Ernest J. Steves .... Texas
Norman R. Stone .... Michigan
William Strollo .... New Jersey
Dean W. Summers .... Illinois
Choji Suzuki .... Japan
Simon F. Tecson .... Bulacan, P. I.
Harold A. Tilton .... New Jersey
Alfred M. Turrian .... Switzerland
James H. Veith .... New York
Fernand G. N. Versini .... France
J. R. Villasana y Benitez .. Cuba
Thomas Vincent .... New Jersey
Herbert W. Volker .... New Jersey
Frank R. Waite, Jr. ..... New Jersey
Willis C. Walter .... New York
John A. Waters .... New York
Frederick LeR. Weed ...... Pennsylvania
Otto W. Weisbrod .... New Jersey
Robert A. Wetzel .... France
John C. Whinnery .... Ohio
Harold M. Whitney .... New York
Roy O. Williamson .... New Jersey
Andrew G. Wilson .... Scotland
Offim P. Wolfson .... Florida
Harry A. Yost .... New York
Roy A. Young .... New Hampshire
Alvin F. Zulauf .... New Jersey

Mitridates Plata (as of the class of 1909).

Degree conferred (as of class of 1913) at University Council, December 12, 1913:

Seiichi Hamamoto — Augustin Leo Lawrence — John Templeton

IOWA STATE UNIVERSITY.

At the annual commencement exercises of Iowa State University, held in Iowa City, Iowa, the Degree of Doctor of Dental Surgery was conferred on the following graduates:

P. M. Anderson .... Minnesota
R. J. Andrews .... Iowa
L. D. Bare ....
W. Barry .... Iowa
J. D. Bellamy .... Nebraska
R. V. Brandt .... Wisconsin
C. W. Casaday .... Iowa
L. V. Cockrum .... Missouri
F. M. Crawford .... Iowa
Donald Crissinger .... Iowa
Paul Curry .... Iowa
L. R. Daly .... Iowa
Geo. Denzler .... Iowa
Leo. Dick .... Iowa
Harry Duwe .... Iowa
J. M. Eason .... Iowa
Joe Esser .... Minnesota
Frank Ettinger .... Iowa
Geo. Fukishima .... Japan
Tjode Grothaus .... Iowa
O. A. Haberdier .... California
Earl Howard .... Iowa
C. F. Huber .... Iowa
Glenn Humphrey .... Iowa
S. A. Katz .... Iowa
Oliver Langland .... Iowa
E. A. Lararia .... California
C. C. Lawhead .... Missouri
R. C. Long .... Iowa
H. H. Loucks .... Iowa
Martin McDevitt .... Iowa
Robert Morse .... Iowa
J. C. Murphy .... Iowa
P. W. Qually .... Iowa
R. W. Rogers .... Iowa
C. A. Ross .... Montana
John Scholton.................. Iowa
J. R. Simpson .... Iowa
R. C. Siple .... Iowa
E. S. Smith .... Iowa
R. M. Smith .... Minnesota
R. V. Smith .... Minnesota
E. R. Swank .... Iowa
R. D. Temple .... Iowa
J. C. Tymony .... Missouri
L. F. Wagoner .... Washington
Alvin D. Ward .... Iowa
L. M. Wise .... Iowa
D. A. Wittrig.................. Iowa
O. Wormhoudt .... Iowa

NEW YORK COLLEGE OF DENTISTRY.

The forty-eighth annual commencement exercises of the New York College of Dentistry were held in Carnegie Hall, New York, N. Y., on June 8, 1914.

An address to the graduates was delivered by Rev. S. Parkes Cadman, D.D.

The degree of Doctor of Dental Surgery was conferred by Rev. Geo. Alexander, D.D., president of the board of trustees and directors, on the following graduates:

Benjamin Alweis .... New York
Harry E. Beiser .... New Jersey
Jacob Bernstein .... New York
Elias A. Blauhut .... New York
David Bloom .... New York
Aaron M. Blumenstein .... New York
Benjamin H. Brod .... New York
Abraham Brusilowsky .... New York
David H. Cohen .... New York
Harry H. Cohen .... New York
Louis Cohen .... New York
Simon Cohen .... New York
Henry A. Cordes .... New York
Max Corn .... New York
Leo A. Cranin .... New York
Willis H. Davis .... New York
Samuel Deutsch .... New York
Alexander Diamond .... New York
Moses Diamond .... New York
Joseph Dintenfass .... New York
Francis J. Edelstein .... New York
Harry L. Ehrlich .... New York
Moses L. Ehrlich .... New York
Robert Elion .... New York
Max Elowitch .... New York
Joseph M. Esnard .... New Jersey
Arnold B. Feldberg .... New York
Maurice Ferdinand .... New York
Harry S. Finkelstein .... New York
Benjamin I. Fishkind .... New York
David Flaumenhaft .... New York
Max Frieberger .... New York
Reuben Friedel .... New York
Maurice Friedman .... New York
Chas. K. Gavin .... New York
Leo Gilman .... New York
Harry Ginandes .... New York
Abraham R. Ginsburg .... New York
David Ginsburg .... New York
Louis Ginsburg .... New York
James Globus .... New York
Benj. L. Glucksman .... New York
Julius Goldberg .... New York
Julius D. Goldman .... New York
David Goldstein .... New York
Max A. Goldstein .... New York
Benno Gruenberg .... New York
Mack M. Heimlich .... New York
Robert T. Hillock .... New Jersey
Herman H. Hoffman .... New Jersey
Meyer Hoffman .... New York
Benjamin Horn .... New York
Morris Joondeph .... New York
Benjamin Kleinberg .... New York
Morris Königstein .... New York
Noah Kraner .... New York
Samuel Krull .... New York
Harry Landy .... New York
Harry Lederkramer .... New York
Samuel S. Leopold .... New York
Charles E. Levin .... New York
Louis Levinson .... New York
Benjamin F. Levy .... New York
William H. Levy .... New York
David Liebers .... New York
Isidore Lifschutz .... New York
Samuel Lubitz .... New York
David Lustgarten .... New York
Fred'k W. Manger .... New Jersey
Ralph M. Margolish .... New York
Jacques J. Marquith .... New York
Frank A. Mayer .... New York
Harry Mendelsohn .... New York
Simon Miller .... New York
Jacob Mindel .... New York
Bartholomew J. Mitchell .... New York
Milton Morchand .... New York
Melvin J. Moses .... New York
Louis Moskowitz .... New York
Bernard Niflot .... New York
Arthur M. Perlmutter .... New York
Leslie C. Peterson .... New York
Morris Pines .... New York
Irving Pocker .... New York
Jac. B. Posner .... New York
Joseph L. Prusslin .... New York
George J. Richman .... New York
Isaac P. Ries .... New York
Harry L. Rosenbaum .... New York
John F. Rosenzweig .... New York
Theodore H. Rositzky .... New York
Mayer L. Rosoff .... New York
Max N. Rubin .... New York
Samuel Rubin .... New York
Karl E. Schmid .... New York
Harry Schnur .... New York
Milton Schreiber .... New York
David Schwartz .... New York
Joseph D. Schwartz .... New York
Max Schwartz .... New York
Morton Seidner .... New York
Abraham L. Seldin .... New York
Arthur A. Selzer .... New York
Thomas E. J. Shanahan .... New York
Harold S. Shulman .... New York
Sebastian Smigel .... New York
Isaac Stamler .... New York
Abraham Stern, Jr. .... New York
Samuel Streim .... New York
Samuel Sussman .... New York
David Tabak .... New York
Herbert J. Taylor-Bell .... New York
Joseph Van Dyk .... New York
Bernard Waldman .... New York
Henry Wasserman .... New York
Charles Wilner .... New York
Leo Winter .... New York
Charles Wolff .... New York
Dickran M. Zakarian .... New Jersey
Frederick W. Ziebell .... New Jersey

VANDERBILT UNIVERSITY, DEPARTMENT OF DENTISTRY.

The annual commencement exercises of Vanderbilt University, Department of Dentistry, were held in Nashville, Tenn., May 25, 1914.

The address to the graduates was delivered by Rev. Carey E. Morgan.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Charles B. Amis	Arkansas
Brodie H. Acker	Texas
Alfred A. Allen	Mississippi
Ernest O. Anderson	Tennessee
Abner M. Applewhite	Mississippi
Horace R. Birdsong	Mississippi
Frank H. Brown	Arkansas
Arthur D. Byrne	Tennessee
Horace D. Cammack	Arkansas
John P. Campbell	Tennessee
Reuben M. Clinkscales	South Carolina
Henry P. Cookenboo	Texas
Albert B. Crutcher	Tennessee
Grover C. Croom	Arkansas
Ernest J. Dorscheid	Tennessee
Lew W. Dougherty	Tennessee
George L. Dowdle	Mississippi
Mark S. Ellis	South Carolina
Charles A. Faulk	Alabama
Elsie M. Gates	Tennessee
Milton R. Grant	Tennessee
Eliphas H. Hart	Oklahoma
James E. Hayes	Tennessee
Isaac W. Hicks	Texas
James C. Hill	Texas
Elmore H. Hinchliffe	Texas
Lee R. Holland	Tennessee
William E. Ikard	Tennessee
Harold D. Jackson	Texas
Charles C. Jones	Texas
Carl A. Lytle	Florida
Earl B. Lytle	Florida
E. F. Myers	Tennessee
Strother M. McKenney	Kentucky
Mabene S. McKenney	Kentucky
Judd M. McMinn	Texas
Daniel P. McNair	Alabama
William A. Norton	Alabama
Charles T. Smith	Arkansas
William J. Stephens	Texas
Archie C. Wiley	Arkansas
Minor P. Wilson	Alabama

PHILADELPHIA DENTAL COLLEGE (TEMPLE UNIVERSITY).

The annual commencement exercises of the Philadelphia Dental College (Temple University), were held on June 4, 1914, in the Academy of Music, Philadelphia, Pa.

Addresses were delivered by President Russell H. Conwell and Rev. Geo. Hodges.

The degree of Doctor of Dental Surgery was conferred upon the following graduates:

Fred L. Ammon	Indiana
Leon L. Bower	Pennsylvania
Russell H. Brown	Pennsylvania
José E. Cachemaille	Cuba
Irving P. Carr	New Jersey
Jesse Cole	Pennsylvania
Norberto M. Coll	Cuba
Manuel F. Comas	Cuba
Harold C. Cryder	Pennsylvania
Juan L. Dorantes	Mexico
A. Leffingwell Douglas	Massachusetts
Daniel J. Eager	New Jersey
Harry A. Elinsky	New Jersey
Charles F. Ferguson	New Jersey
Louis R. Gans	Connecticut
Juan G. Garriga	Cuba
Leon A. Halpern	Pennsylvania
Poul H. Hildebrandt	Denmark
John C. Holley	Georgia
Albert R. Horan	Pennsylvania
James P. Hoye	Massachusetts
Percival C. Johnson	Pennsylvania
Frank S. Kaiser	New Jersey
J. A. Marlowe	Georgia
Carlos Mata	Puerto Rico
Romain W. Miller	Pennsylvania
R. Edward F. Millington	Pennsylvania
John A. Nightengale	Pennsylvania
Louis E. Nightengale	Pennsylvania
Carlos Penedo	Puerto Rico
Walter A. Pennington	New Jersey
Sarah B. Pogost	Pennsylvania
Joseph F. Quinn	Connecticut
Carlos M. Quinones	
Cenute W. Richardson	Jamaica
Joseph R. Riden	Pennsylvania
Leo M. Ruddy	California
Harold M. Shalit	Maine
Lewis M. Shalit	Maine
Luis F. Soto	Guatemala, C. A.
Robert G. Stringer	Pennsylvania
Thomas F. Walsh	New Jersey
Samuel W. White	Pennsylvania
Oscar Fr. Saabye Wiggers	Denmark
John H. Yearick	Pennsylvania
Albert A. Zinkoff	New York

WASHINGTON UNIVERSITY, DENTAL DEPARTMENT.

The fifty-third annual commencement exercises of Washington University, Dental Department, were held on Thursday, June 11, 1914, in St. Louis, Mo.

An address was delivered by Rev. Wm. C. Bitting, D.D.

The degree of Doctor of Dental Surgery was conferred by Frederic A. Hall, LL.D., on the following graduates:

James M. Ashley	Charles F. Elder	Ira T. Maupin	Clifford A. Ross
John F. Baber	Grant C. Gentry	John A. McCarroll	Otto Schlicht
Owen I. Bird	Charles B. Harrison	George A. Miller	William T. Simmons
Oris B. Brite	James A. Heieck	DeWilton H. Milstead	Clyde P. Springgate
Roscoe T. Burns	Oscar J. Hirth	Paxton Morrison	Charles O. Thomson
Albert W. Caplin	Osee M. Hux	Walter F. Neuhoff	James Titterington
Maurice H. Caplin	Elmer H. Jacobsmeyer	Henry Nomura	Harold E. Weir
Harry H. Chapman	Saitaro Kageyama	John T. Obert	Henry F. Westhoff
William L. Conrad	Francis M. Kane	William E. Poole	Victor D. Winters
George H. Creegan	Charles E. Line	Samuel J. Rhode	Lloyd B. Wright

UNIVERSITY OF MARYLAND, DENTAL DEPARTMENT.

At the annual commencement exercises of the University of Maryland Dental Department, the degree of Doctor of Dental Surgery was conferred on the following graduates:

Frank H. Ackrill	Connecticut
Frederic B. Askins	New York
Wm. G. Beland	Massachusetts
Leslie D. Bell	Bermuda
Rene A. Bibeau	Massachusetts
Frank R. Bristol	New York
Aaron A. Bross	Connecticut
Willard C. Bundy	Rhode Island
Eva C. Carter	Virginia
Joseph C. Carvalho	Massachusetts
Salvador A. Cocco	Dominican Republic
Jacob J. Cooley	Massachusetts
Geo. A. Dunphy	Rhode Island
Maurice S. Dunn	Connecticut
Armando I. F. Maymir	Cuba
Harold J. Foley	Massachusetts
Harvey K. Foster	North Carolina
John H. Frederick	Maryland
Wallace D. Gibbs	North Carolina
Lewis Goldstrom, Jr.	Maryland
Ramon G. Goyco	Porto Rico
Benjamin Gross	Connecticut
Michael Groves	South Carolina
Benjamin A. Guard	Virginia
Manuel G. Guerra	Portugal
Elmer E. Hachman	Maryland
Dalton L. C. Harbaugh	Pennsylvania
Benjamin J. Hammet, Jr.	South Carolina
David S. Highkin	Maryland
Matthew C. Holmes	Maryland
Joseph Hoy	Massachusetts
Harold E. Hyde	West Virginia
Wm. T. Jenkins	West Virginia
Herbert E. Keller	New Jersey
Harry B. Lacy	Virginia
John R. Lamb	New York
Henry R. Lasch	Connecticut
J. J. Leininger	New York
Arthur H. Lepine	Massachusetts
Jacob B. Levenson	Maryland
Herbert F. Lewis	New Hamsphere
Clarence W. Mara	Connecticut
Abraham H. Mendelsohn	Maryland
Chester E. Miller	Maryland
Joseph S. Mitchell	Massachusetts
F. Ulises O. Mendez	Cuba
Sanshiro Okugawa	Japan
Robert M. Olive	North Carolina
Thomas F. O'Neil	Connecticut
P. P. Payne	Maryland
Henry T. Phelan	Rhode Island
Henry J. Pieper	New York
Solomon L. Quitt	Maryland
John R. Radice	Maryland
W. Ray Richards	Maryland
J. Ben Robinson	West Virginia
Frank L. Rogers	Massachusetts
C. Albert Ruppersberger	Maryland
Chas. M. Sanders	South Carolina
James H. Samuel	New Jersey
John P. Sheehan	New York
Thomas L. Spoon	North Carolina
Maurice E. Stein	New York
Julius H. Summerfield	Maryland
Wm. C. Taylor	North Carolina
John C. Tinsley	Virginia
Julian M. Tiss	New York
Francis H. Vail	Connecticut
Robert L. Ward	Alabama
Harold E. B. Webb	Maryland
B. Sargent Wells	West Virginia
Geo. J. Whalen	Massachusetts
Adolphus E. Worsham	North Carolina
Wm. T. Wright, Jr.	Virginia
Edwin C. Yost	Virginia

INDIANA DENTAL COLLEGE.

THE thirty-fifth annual commencement exercises of Indiana Dental College were held in Indianapolis, Ind., on June 9, 1914.

Dr. Frank B. Wynn of Indianapolis delivered an address.

The degree of Doctor of Dental Surgery was conferred by Dr. J. N. Hurty, president of the board of trustees, on the following graduates:

Troy L. Babcock	Alvin D. Farver	Carl E. Ingalls	John W. Puffer
Paul V. Barnhill	Lynn A. Fonner	Clarence C. Keffer	Frank Rank
Verl A. Bebout	Lee S. Fountain	William N. Kelly	Lee B. Schrader
Charles Y. Browne	Oren L. Fouts	Harry W. Kinney	Carl S. Schmucker
John E. Buckner	Arlington W. French	Benjamin LaBurt	Guillermo V. Seigler
George L. Canada	Willard B. Gates	Herbert S. Leach	Russell F. Slinkard
Ronald W. Carmichael	Charles S. Glaser	Adam E. List	George L. Spalding
Merle W. Catterlin	Douglas D. Godwin	Chester K. Little	James V. Sparks
Russell H. Cooper	Myron C. Gould	Howard B. McLain	William J. Stark
Samuel H. Davis	Harry F. Gravel	Alexander H. Malerich	Harry V. Talbert
William H. Day	Leslie S. Harlan	Maurice A. Marr	J. Russell Teeter
Walter F. Dean	Laurence F. Haskett	William G. Martz	Austin H. Todd
Burrell E. Diefendorf	Norman Y. Hooper	Benjamin F. Neiman	Roy A. Tucker
Howard C. Dressel	James Holloway	Wylie C. Owings	Charles R. Wagner
O. Edgar Ellis	Reuben H. Hvezda	James H. Poston	Lex E. Wilkinson

COLLEGE OF DENTAL AND ORAL SURGERY OF NEW YORK.

THE annual commencement exercises of the College of Dental and Oral Surgery of New York were held in Æolian Concert Hall, New York, N. Y., on May 25, 1914.

The valedictorian was Howard Milton Potter, and the address to the graduates was delivered by Rev. Chas. E. Jefferson.

The degree of Doctor of Dental Surgery was conferred by Mr. Clarkson Cowl, president of the board of trustees, on the following graduates:

Emily G. Antopolsky	New York
Lawrence Barnett	New York
Nathan Bauman	New York
Fanny Bedrick	New York
Clara Blaustein	New York
Isidore Blumenthal	New Jersey
Rose Blumenthal	New Jersey
Elenora McN. Bonnefond	New York
Andrew J. Brucklacher	New York
William H. Drum	New York
Emil Eichel	New York
Benjamin Engel	New York
Morris Epstein	New York
Esther Feinberg	New York
Samuel Feit	New York
Bennett A. Fischel	New York
Louis O. Finkelstein	New York
Louis Friedland	New York
Frank Waldo Fry	New York
Clara S. Gabowitz	New York
Louis Gample	New York
Manuel Goldwater	New York
Samuel Grief	New York
Martin Dana Harris	New Jersey
Harriette Hart	New York
Julian Benjamin Hart	New York
Mark Hoorewitz	New York
Joseph F. Howard	New York
Clara Jeshurun	New York
Thomas O. Johnson	New Jersey
Annie Katz	New York
Esther Kirschenbaum	New York
Mary Kompaniez	New York
Rose Jewelle Lifshitz	New York
Clarence Longenecker	New York
Ella Gertrude Mark	New York
Florence McKeever	New York
Frank Boyle O'Brien	New York
Edwin O'Neil	New York
Howard Milton Potter	New York
Thomas Frank Prach	New York
Siegford Pulvermacher	New York
Henry Howard Reiss	New York
Leo Rosen	New York
Joseph N. Sablow	New York
Daniel Salzman	New York
Julius Sheinman	New York
Edith D. Schevcik	New York
Isidor Schmeidler	New York
Jacob Sommer	New York
William Veal	New York
Joseph R. Vigiano	New York
Henriette Weissman	New York
Benjamin Withers	New York
Felix Wolff	New York

Society Notes and Announcements.

DENTAL SOCIETY MEETINGS:

August.

MINNESOTA STATE DENTAL ASSOCIATION. Duluth. Three days: August 6th to 8th.

SIXTH INTERNATIONAL DENTAL CONGRESS. London, Eng. Six days: August 3d to 8th.

Examiners' Meetings.

ARIZONA BOARD OF EXAMINERS. Phoenix. October 5th.

WYOMING BOARD OF EXAMINERS. Cheyenne. September 1st to 3d.

MINNESOTA STATE DENTAL ASSOCIATION.

THE thirty-first annual meeting of the Minnesota State Dental Association will take place in Duluth, Minn., August 6 to 8, 1914, at which time the officers of the society unite with the Duluth men in promising a most instructive and enjoyable meeting.

BENJAMIN SANDY, *Sec'y*,
Minneapolis, Minn.

STATE UNIVERSITY OF IOWA ALUMNI ASSOCIATION.

THE next meeting of the Alumni Association of the Dental College of the State University of Iowa will be held at Iowa City, during the home-coming week, on Thursday, October 22, Friday, October 23, and Saturday morning, October 24, 1914. The Iowa-Minnesota football game will be played on Saturday afternoon, October 24th.

The entire meeting will be devoted to prosthodontia. The officers take pleasure in announcing that they have secured the services of Dr. G. H. Wilson of Cleveland, Ohio, author of the most modern and thorough work on dental prosthetics, and Dr. Forrest H. Orton of St. Paul, Minn., professor of crown and bridge work at the Dental College of the State University of Minnesota.

Dr. George H. Wilson will lecture and demonstrate on anatomical occlusion, its underlying principles, elucidating and comparing modern methods; also the retention of artificial dentures, discussing the different principles and demonstrating the different methods. Dr. F. H. Orton will give a lecture and clinic on crown and bridge work.

Names of other prominent prosthodontists who will contribute to this meeting will be announced later.

RICHARD SUMMA, *President*,
JOHN VOSS, *Sec'y*.

AMERICAN MILLER MEMORIAL.

TO THE DENTAL PROFESSION OF AMERICA:

The committee appointed by the Ohio State Dental Society at the 1909 meeting for the purpose of raising funds for an American Memorial to the late Dr. W. D. Miller desire to make the following report:

Funds have been received from the following states: Alabama $25.00, Arizona $25.00, Arkansas $50.00, California $60.00, Colorado $82.00, Connecticut $50.00, Georgia $60.00, Illinois $531.00, Iowa $200.00, Indiana $75.00, Kansas $134.50, Kentucky $105.00, Maine $25.00, Massachusetts $100.00, Michigan $300.00, Minnesota $100.00, Missouri $100.00, Montana $15.00, Nebraska $100.00, New Hampshire $25.00, New Mexico $25.00, New York $125.00, Ohio $1303.00, South Carolina $25.00, North Dakota $50.00, South Dakota $15.00, Oklahoma $31.00, Oregon $50.00, Pennsylvania $20.00, Tennessee $50.00, West Virginia $25.00, Washington $50.00, Wisconsin $25.00, Wyoming $10.00, Texas $50.00, Utah $14.00, Vermont $20.00, Virginia $50.00. Total $4300.50; interest on this fund to December 1, 1913, amounts to $382.94, making a total in the hands of the treasurer, Dr. Weston A. Price, of $4683.44. Florida and Mississippi have each voted

$50.00, but the amounts are not in the treasurer's hands at this date.

The Memorial will consist of an 8-foot bronze statue of Dr. Miller mounted on a 7-foot granite pedestal, to be placed on the lawn of the public library, the most appropriate site in the city of Columbus, the capital of Dr. Miller's native state. Suitable tablets will be prepared, and it is the desire of the committee to state on one that the monument is erected by funds from every state in the Union. If your state is not represented in the above list, we want your co-operation in placing it there.

It is hoped that sufficient funds—$5500.00—will be in the treasury that steps can be taken at once toward the construction of this memorial, so that it may be finished and ready for unveiling at the 1915 meeting, which will be the fiftieth anniversary, of the Ohio State Society. The valuable co-operation of the honorary committees in the several states is hereby acknowledged; they have made this memorial a reality.

Other professions have done honor to their distinguished dead; let us do the same for Dr. Miller, whose life was one of unselfish devotion to the scientific advancement of dentistry.

Yours very truly,

EDWARD C. MILLS, *Chairman*,
J. R. CALLAHAN,
S. D. RUGGLES,
Committee.

COLUMBUS, OHIO, April 7, 1914.

NATIONAL MOUTH HYGIENE ASSOCIATION.

A SERIES of illustrated lectures on Mouth Hygiene is being prepared by this association for rental service. The first lecture of the series, a talk suitable for a mixed adult audience or school pupils above the age of twelve years (designated as lecture "A") is now ready. The lecture set (manuscript and 36 slides) will be furnished to members of state dental societies and others who may be considered as competent to present the matter to the public, at a fee of One Dollar per use.

For further particulars and application blanks, address the Director of Extension Lectures,

EDWIN M. KENT, D.M.D.,
222 Washington st., Brookline, Mass.

International Exhibition, Lyons, 1914.

ORAL AND DENTAL HYGIENE CONGRESS.

Lyons, France, September 24–28, 1914.

Dear Colleague,—Inasmuch as hygiene in general is rapidly growing in public recognition, it has been deemed most desirable that a Congress of Oral and Dental Hygiene shall form a constituent part of the general Hygiene Congress which is to be held in Lyons during the International Exhibition to take place there in September next.

Preparations for this congress are being made under most favorable auspices. The most distinguished scientists are giving it their patronage, and its synchronizing with the great Exhibition organized by the city of Lyons greatly enhances the assurance of success both for the meeting in general and for the special section devoted to the consideration of the oral and dental phases of hygiene.

We desire to appeal to all workers in the field of diseases of the mouth and teeth, believing that—laying aside subjects of professional disputation—we can heartily meet and harmoniously exchange ideas on the subject of oral hygiene, with most profitable results to ourselves and our patients.

The congress will include active members and associate members (members' relatives). Dues have been fixed at 15 fr. for active members and 5 fr. for associates.

Members will be entitled to many privileges. The Transactions, with papers and discussions, will be forwarded to them free of charge. The Committee of Organization is preparing official receptions and festivities and arranging for excursions. A Ladies' Committee will cordially receive our *confrères'* wives and will endeavor to make their stay in Lyons as pleasant as possible.

It is unnecessary to enlarge upon the opportunity presented by this occasion from the professional standpoint. The undersigned, in the name of the Committee of Organization, solicit your enrollment as an active member, and request that you forward your application at your earliest possible convenience, also the title of any paper which you may have to present to the congress, to the general secretary, Dr. J. Vichot, 6 rue de la Barre, Lyons.

With fraternal greetings,

A. PONT, *President*,
J. VICHOT, *Gen. Sec'y.*

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. Harvey Blain, *Sec'y*,
Prescott, Ariz.

WYOMING BOARD OF EXAMINERS.

The Wyoming State Board of Dental Examiners will meet at Cheyenne, Wyo., in the Senate chamber, on September 1, 2, and 3, 1914.

The written examination consists of anatomy, physiology, histology and bacteriology, chemistry and metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica and tnerapeutics, prophylactics, and orthodontia. Applicants must present a full plaster model of upper and lower jaws with teeth, also one without teeth. Practical work will be required from all candidates taking the examination. The candidate is required to furnish his own operating instruments, dental engine, amalgam, gold, wax, and modeling compound.

For further information and application blanks, address

Peter Appel, Jr., *Sec'y*,
P. O. Box 643, Cheyenne, Wyo.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending June 20th—(No changes).

For the week ending June 27th:

First Lieut. E. P. Tignor, June 16th, granted one month's leave about July 3d.

First Lieut. J. H. Hess, June 19th, ordered to Yellowstone, July 1st.

First Lieut. G. E. Stallman, ordered to Fort McIntosh and Laredo, Texas, for temporary duty.

For the week ending July 3d—(No changes).

For the week ending July 10th:

Raymond W. Pearson, act.d.s., recently appointed, will proceed to Fort Sam Houston, Texas, for assignment to duty.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE 1914

June 2.

No. 1,098,972, to Harry R. Priest. Suction cup for dental plates.

No. 1,099,101, to Lucius Robertson. Impression cup.

June 9.

No. 1,099,248, to Jeptha G. Hollingsworth. Method of preparing dental fillings.

No. 1,099,393, to Samuel H. Pollock. Artificial tooth.

June 23.

No. 1,101,439, to Jeptha G. Hollingsworth. Dental appliance.

No. 1,101,504, to Cristoph F. Montag. Orthodontia appliance.

June 30.

No. 1,101,810, to Grover C. Otrich and Julius L. Bischof. Means for securing dental plates in position.

No. 1,101,885, to John A. Sawhill. Dental clamp.

No. 1,101,947, to Newton Morgan. Guard and grinding wheel moistener for dental handpieces.

DR. GEORGE EDWIN HUNT.

THE

DENTAL COSMOS.

VOL. LVI. SEPTEMBER 1914. No. 9.

ORIGINAL COMMUNICATIONS.

A STUDY OF SOME ETIOLOGICAL FACTORS OF MALOCCLUSION.

By MILO HELLMAN, D.D.S., New York, N.Y.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, at its fifth annual meeting, New York City, April 23, 1914.)

"THE causes of malocclusion, to be intelligently comprehended, must be studied from the basis of the normal growth of the denture and its correlated parts. Most of the immediate causes are mechanical, yet whatever acts as a hindrance to nature in performing her delicate offices in the unfolding of the various tissues composing the dental apparatus during its growth will be operative as a cause in producing malocclusion"—Angle(1).

SIGNIFICANCE OF THE EARLY ETIOLOGY OF MALOCCLUSION.

Viewing the phenomenon of malocclusion of the teeth from such a point, it appears of advantage to approach the etiologic problem from a general biological direction. If growth is to be accounted for in the development of this anomaly, a survey of its phases manifested at various stages in the course of its progress is of paramount importance. "The process of growth," according to Prof. T. H. Morgan(2), "may be said to begin with the egg and end with the adult." Similarly, the process involved in the establishment of malocclusion may be said to begin with the differentiation of the cells destined to become the future dental organs, and end with the completed permanent dentition. If these are accepted as the two extremes of the period during which malocclusal conditions may arise, it is evident that there is a vast range of circumstances that must be taken cognizance of, if a careful examination into the causative factors of this disturbance be undertaken. In other words, if a disease is minutely described by a complete account of its diagnostic features, we are not led to believe that *that* is the beginning of the disturbance, but, on the contrary, that at the described stage the disease is in full bloom. For, like all other processes, disease processes have their origin, development, and culmination, and it entirely depends upon the knowledge with which such a process is observed, whether its characteristics will be perceived. The

more meager our knowledge relative to any disturbance, the more pronouncedly the manifestation will have to appear before we are enabled to recognize the trouble, and *vice versa.* This is true of malocclusion of the teeth; the less we know about it, the more pronounced the anomaly must appear before it can be diagnosed as such. As a consequence, malocclusion was, until quite recently, associated only with the permanent dentition [Angle(3), Zsigmondy(4), and others]. However, with accumulated knowledge, keener observation ensued, and these disturbances were finally also found to occur in the deciduous series [Angle(5), Dailey(6), Stanton(7), Chapman(8), Körbitz(9), Young(10), Strang(11), Zielinsky(12) and others].

The etiology of malocclusion was by no means exempt from the natural sequence of events. A French artist, Meissonier, I believe, once said that we see only what we know. It is therefore readily intelligible that, where a disturbance in occlusion was observed only when fully established in the permanent dentition, the causes thereof were also attributed to conditions immediately related to it. With more extensive studies a deeper insight was gained into this problem, and with this came keener observation; and what appeared at first a direct cause of a certain form of malocclusion now proves to be the result of a number of more profound and obscure factors, upon the co-operation of which may depend such processes as would involve not only the perfection of the masticatory apparatus, but also the entire skeletal structure of the individual, as, for example, rhachitis.

STAGES OF ONTOGENETIC DEVELOPMENT.

In order, therefore, to enter upon a systematic search for some etiologic factors of malocclusion, we must begin with a brief review of the most important events occurring during ontogenetic development, and note from a general viewpoint to what particular incident certain forms of this anomaly may be attributed.

J. W. Ballantyne(13), in his "Manual of Antenatal Pathology and Hygiene," represents the entire range of prenatal development and growth in the following periods:

(1) *Germ cell period.* *a,* Ante-conceptional period. *b,* Post-conceptional period. Fertilization.

(2) *Embryonal period.*

(3) *Neofetal period.*

(4) *Fetal period.*

BIRTH.

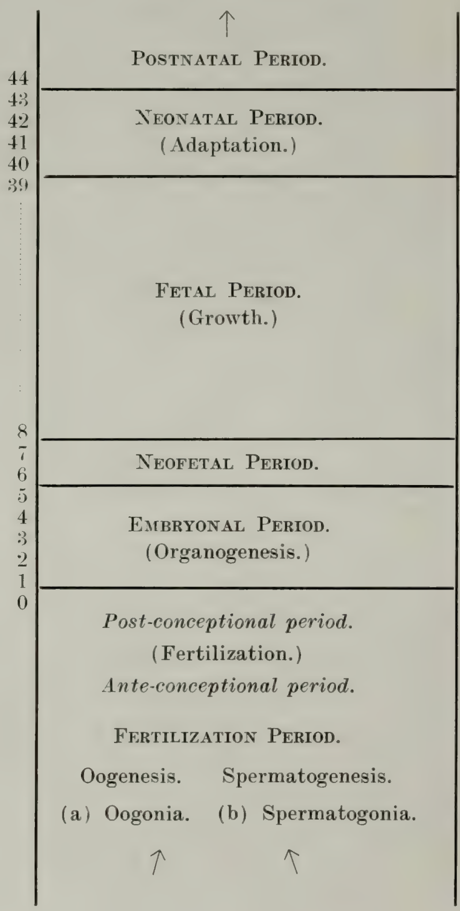
(5) *Neonatal period.*

(6) *Postnatal period.*

Chronologically represented, we find these phases in the diagram presented as Fig. 1.

FIG. 1.

(DIAGRAM AFTER BALLANTYNE.)



The question may be asked, What is the meaning of this division? Is it merely a record of events occurring at certain intervals in the life-cycle of an individual? Or is it simply a tabulated series of facts for a convenient survey of the sum total of occurrences during individual development?

Though all divisions pertaining to vital processes are arbitrary and exist mainly in our manner of thinking, in nature they serve to designate certain phenomena, in some sense as we would resolve a sum into its constituent factors.

If it be remembered that throughout the entire range of growth an enormous number of factors are involved in the process, and that the factors themselves are of an infinitely diverse character, it becomes apparent of what an extremely complex nature the mechanism at work is. Moreover, if an harmonious co-operation of everything concerned in this process is attained, the periods outlined will be manifested, and the normal will be perfected. But if from any cause whatever a disturbing element should intervene during the operation of this highly intricate process, a digression will ensue, and a consequent deviation from the normal will result. Of course, the extent of such deviation will depend upon the character of the disturbing influence and the period of its occurrence; the earlier the stage of development during which such disturbance may occur, the more readily will the organism be influenced, and the more persistent and severe will be the harm done. Conversely, the higher the degree of a malformation when observed, the earlier its cause must have been at work.

It is evident, then, as Hutchinson(14) contends—

(1) That the term "disease" is a purely relative one.

(2) That it would appear to consist chiefly of a vital, and even from a "cell" point of view, healthful process on the part of some cell or tissue group, which is out of harmony with the balance of the activities of the entire organism.

(3) That *morbid* activity is at bottom *healthy* activity gone wrong—life out of place.

(4) That the processes of disease pursue an orderly succession, and are subject to laws which may be studied and ascertained.

(5) That pathology is simply a branch of biology. And . . . that disease has not merely a natural history, but an ancestry of its own. Indeed, in many cases it will be found to be a revelation of the ancestral history of the tissue of an organ in which it occurs.

To digress for a moment, it has always baffled me to know exactly in what province in the domain of pathology malocclusion of the teeth may really belong. E. Schwalbe(15) divides pathology into nosology, treating on the science of disease, and dysontogeny, treating of disturbances of development and growth. According to the most modern conception of the disturbances which we are called upon to treat, this division would seem to allot a definite place for orthodontia in the realm of medicine.

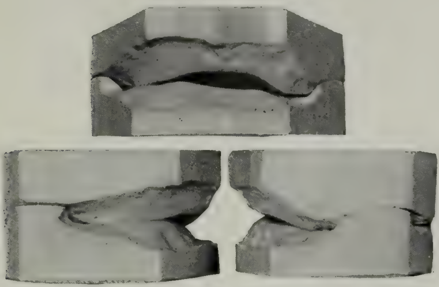
Reverting now to the topic on hand, I shall make the burden of my subsequent remarks the effort to direct your attention to the following: (1) That malocclusal conditions in general may be observed at a much earlier stage in development than most of the authorities would lead us to believe; (2) that some causes of malocclusion are therefore far more remote and obscure than hitherto described, and (3) that a prolific cause of malocclusion appears to be the inability of mothers to nurse their infants, and the consequent probable effects of the apparatus employed in artificial feeding.

EARLY RECOGNITION OF OCCLUSAL ANOMALIES.

The modern conception of malocclusion may be expressed as *a manifestation of disturbances in the development of the jaw-bones, resulting in interference with the functions of mastication, respiration, and speech, and disturbing the esthetic appearance of the dental arches and facial expression.* The most important diagnostic features by which these disturbances are recognized are represented by the teeth and their occlusal

inclined planes. We must, however, beware of confounding the diagnostic landmarks with the disturbance itself, *i.e.* we must remember that the disturbance exists in the bone, while the teeth only help us to recognize it. As evidence of

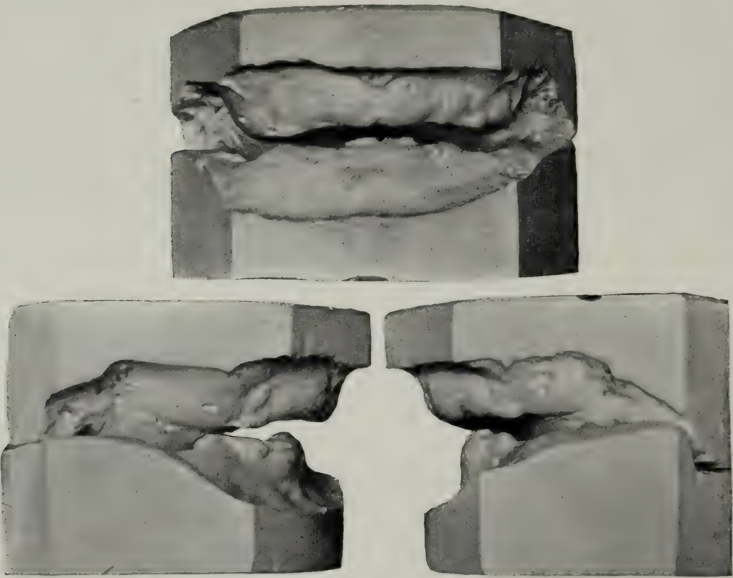
Fig. 2.



Showing malrelations of the jaws at birth.

this we may have disturbances in the development of the jaw-bones before the eruption of the teeth. The observation of three such cases led me to this belief. Two were newborn infants, and one six weeks old. Of course, as it was impossible to obtain models or even photographs in the desired positions, I had to resort to a written record of them. The upper alveolar process was in advance of the lower, and the expression about the mouth resembled very much that which is so closely related to a case belonging to class II, division 2, in the adult. One of these infants is now two years of age, and has a decided class II, division 1, case of malocclusion. I was later more fortunate to discover a set of models (Fig. 2) in Dr. Rolof B. Stanley's collection, which he kindly consented to let me use to illustrate this point. These models were prepared from impressions taken postmortem of an infant five days old. Another illustration of this point you will find in Fig. 3, also belonging to Dr. Stanley,

Fig. 3.



Malrelations of the jaws at the age of five months.

and obtained from impressions of a five-months-old baby. There are, however, many more cases on record (Ballantyne), describing antenatal disturbances in the

growth of the mandible, for instance, where the deformity may vary from a slight diminution in size to a complete absence of the bone.

REMOTENESS AND OBSCURITY OF SOME CAUSES OF MALOCCLUSION.

Relative to our knowledge of the etiology of malocclusion, Professor Tandler([16]) adequately expresses his opinion of the situation when he says that "We have not yet advanced beyond the realm of vague supposition." If we should examine the countless modifications that a developing organism passes through from inception to parturition, and realize the underlying conditions bringing about these remarkable transformations, until the completion of an individual, we shall not wonder that a malformation may appear now and then, but we shall be surprised that such disturbances are not the rule instead of the exception.

"No period of nine months in childhood, in adult life, or in old age," says Ballantyne, "is so replete with occurrences so diverse in kind and of such far-reaching importance as is that spent by the unborn infant *in utero*."

Let us glance again at Fig. 1, to recall the essential periods of antenatal development, paying particular attention to such instances as may give rise to disturbances having some relation in later life to malocclusion of the teeth.

Germ-cell period. Beginning at the very bottom of the chart, at the germ-cell period, it would at first thought seem far-fetched if any reference to malocclusion be made in this connection. But on careful deliberation we shall realize that one of the weightiest factors in the make-up of the progeny is brought into play at this period. Who can estimate the extent to which the influence exerts itself as embodied in the mystery of heredity? This influence, though dwelt upon by many authors in relation to orthodontia, and refuted by others, has, with the exception of Dr. Stanton's allusion to it, as yet not been approached with any gratifying degree of exactness, and is still an enigma so far as it is involved in the problems of malocclusion of the teeth.

Fertilization. Fertilization, comprising the ante-conceptional and post-conceptional period, can only be accounted for in the assumption that the germ cells as well as their immediate environment are efficient, and potentially capable of initiating the processes that later result in development and growth. "Just as birth marks not a beginning but a stage in the life of the individual, so impregnation marks not a beginning, but a stage in the life of the family" (Ballantyne). It must, however, not be overlooked that, even at this early period, some possible defects, either within the cells themselves or their surrounding medium, may exert some detrimental influence upon the potentiality of the elements concerned, and interrupt the process either during or shortly after segmentation. Thus most evident disturbances manifested *post partum* date back only as early as the embryonal period. At that time the external form is undergoing its metamorphosis, and any interference in this process, due to physical condition or hereditary taints of the progenitors, will bring about a malformation. Though these malformations do not appear harmful during antenatal life, they become serious handicaps thereafter. The evidences of these disturbances come to us in the form of hare-lip, cleft palate, mandibular cleft, and their variations and modifications, which, according to a number of authorities—Schwalbe([17]), Karl Grünberg([18]), Wieland([19]), Biondi([20]), and others—is due not only to the failure of union of the palatal, fronto-nasal, maxillary, and mandibular processes, but also to their deficient growth.

Neofetal period. The neofetal period is represented mainly by *the establishment of the placental circulation.* But as the differentiation of the cells constituting the dental lamina and the formation of the dental germs also occur at that time or very closely preceding it, it may be evident that here also the occurrence of some anomalies may be

imminent; thus the absence of teeth or the genesis of supernumerary teeth might date back to this period.

Fetal period. Disturbances occurring during the fetal period bear abundant evidence in the masticatory apparatus. Although the various tissues necessitating lime deposits, such as the skeletal structures and the teeth, are formed during the embryonal period, their calcification continues throughout the entire fetal period, and is not completed until long after birth. During this period also are completed the various organs and glands perfecting the entire organism. That the various groups of organs and glands thus formed also begin to functionate *in utero* immediately upon their completion is little to be doubted; but whether their antenatal functions simulate those of the postnatal period has as yet not been ascertained. However, their functions are sufficiently established to allow interferences to intervene and to produce pathological conditions. Thus F. Schwartz([21]) examined five hundred newborn infants at the Second Vienna Obstetric Clinic, and found that 80.6 per cent. showed rhachitic changes in the skull or in the ribs, or in both skull and ribs. F. Fede and E. Cacace([22]) and Ballantyne disagree with these findings, as do many others, but that such conditions do exist is not denied by anyone, for Ballantyne himself suggests that—"Although the cause of the dystrophy described as rhachitis is unknown, it may be guessed that the conditions which produce it in postnatal life are active in a modified form or in a different degree here, and they arrest the formation of bone from cartilage, while they allow the proliferation of cartilage itself." The two models shown in Figs. 2 and 3 are those of a rhachitic newborn and of a five-months-old infant. To this period we may also ascribe the disturbances that come to us in the form of hypoplasias in the enamel of the deciduous dentition.

Neonatal period. "The great physiological event of neonatal existence is the adaptation of the organism to its new environment; the fetus is suddenly brought into surroundings which demand the functional awakening of several organs which have in intra-uterine life been almost if not quite dormant, and structures which have been active have to atrophy, be absorbed, or be utilized for other than their antenatal purposes."

Birth. "Birth, then," according to Ballantyne, "is the more or less traumatic transition from the protected semi-parasitic life of the fetus to the more exposed and ultimately independent existence of the infant; but traumatism is not the only occurrence in the physiology of the neonatal period of life, for it is during the three or four weeks that follow birth that the organs of the newborn infant take up the work now thrust upon them, and formerly peformed in great part by the placenta. It is a time of readjustment, of adaptation, of alteration, and of metamorphosis." Later on, in child and adult life, correlations existing between malocclusal conditions and other disturbances have been studied by a number of observers. For instance, in mental defectives and idiots, in those of monstrous bodily development, abnormal formations of the palate have been demonstrated. Drs. Walter Channing and Clark Wissler([23]) have shown a relation to exist between feeble-minded individuals and the form of the hard palate. Barthels([24]) found in those afflicted with hypertrichosis universalis abundant malocclusal conditions. Michelson([25]) described a family with heterotopy which showed a number of occlusal anomalies, tardiness in the eruption of deciduous teeth, and impaction of the molars. This would indicate that there are certain forms of agents in the brain that would have some influence upon the establishment of malocclusal conditions. Besides, malocclusal conditions are also traceable in deaf-mutes, in whom, according to G. Fischer, as high as 50 per cent. were found to present deformed palates.

Disturbances in the ductless glands have been found to have some relation to malocclusal conditions. Cretins frequently show extreme malocclusions of the teeth.

In individuals afflicted with this dystrophy, it will be seen that owing to the

Fig. 4.

A B

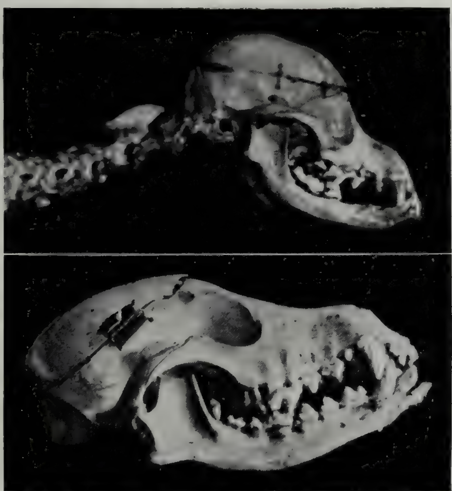
Effect of experimental thyroidectomy on stature. A, Normal dog. B, Thyroidectomized dog.

absence or atrophied condition of the thyroid gland, there is a general stuntedness in stature and in some of the facial

Fig. 5.

A

B



Effect of experimental thyroidectomy on the head, jaws, and teeth. A, Thyroidectomized dog. B, normal dog. (After Biedl.)

bones, especially in the jaw-bones, a retardation in the eruption of the teeth, and, in many cases, also a reduction in the size of the teeth. Fig. 4 shows two dogs of the same litter, four months old. Experimental thyroidectomy was performed by A. Biedl([26]) on the smaller specimen when three weeks old, causing its present stunted growth. Fig. 5 shows the effect this operation produced upon the skull, jaws, and teeth, as compared with the normal animal.

The case portrayed in Fig. 6 is a typical representation of a form of disturbance diagnosed as class III (Angle).

Fig. 6.

a *b* *c*

d *e* *f*

Facial changes brought about in a case of acromegaly. *a*, 1892. *b*, 1896. *c*, 1903. *d*, 1907. *e*, 1909. *f*, 1910.

The cause of the deformity in this particular instance was not due to enlarged tonsils and the effort to push the mandible forward in the attempt to breathe more freely.

Though the etiology of class III, apart from these two factors, is extremely obscure, that of this case (Fig. 6) was correctly diagnosed and clearly described by Pehr Gadd([27]) of Helsingfors, Finland. It is a case of acromegaly, and was caused by a tumor in the pituitary body, from which the patient died. The facial changes (Fig. 6, *a* to *f*) that took place from the fourteenth to the thirty-first year are most marked, as were also

the dental changes which occurred during the period.

ARTIFICIAL FEEDING A PROLIFIC CAUSE OF INFANT MORTALITY.

Of the increased activities succeeding birth that are of greatest moment are the functions concerned with nutrition, especially those of the oral cavity. Although the act of birth transposes the newborn from a dependent to an independent existence, as is manifested by the change in circulation, digestion, respiration, etc., the infant is still dependent upon the mother for its nutrition. And in proportion as this dependence is prolonged and of a normal and vigorous character, the infant's health and life are more secure. Thus it has been statistically proved in Berlin that the mortality of infants fed on cow's milk in their first year is six times greater than that of breast-fed infants. [*Statistisches Jahrbuch der Stadt,* Berlin, vols. xvi and xvii; *Statistik der Jahre 1889 u. 1890,* Berlin, 1893. S. 30 u. 148. Quoted after Bunge.]

In a recent address Dr. Thomas F. Harrington([28]) said—"From 80 to 90 per cent. of all deaths from gastro-intestinal diseases among infants take place in the artificially fed; or ten bottle-fed babies die to one which is breast-fed. In institutions it has been found that the death-rate is frequently from 90 to 100 per cent. when babies are separated from their mothers. During the siege of Paris (1870–71), the women were compelled to nurse their own babies on account of the absence of cow's milk. The mortality of infants under one year fell from 33 to 7 per cent. During the cotton famine in 1860, women were not at work in the mills. They nursed their babies, and one-half of the infant mortality disappeared."

INABILITY OF MOTHERS TO NURSE.

In an effort to learn the extent of the inability of women to nurse their infants, as well as to arrive at the cause of it, G. von Bunge([29]) began an investigation of the problem in 1899. During the succeeding ten years 40,000 question charts were sent out to physicians in all the German-speaking countries—Germany, Austria, Switzerland. Up to 1909, two hundred and twelve practicing physicians and thirty-nine students participated in the answers of these question charts; and during this period, 2401 charts were received which were accurately filled out and utilized in the compilation of statistical data. It appears from this extensive investigation that of the 2401 cases reported, 883 were capable of nursing all their infants for nine months or more, and 1518 were decidedly unable to do it. Bunge also proves that inability to nurse is transmitted to all succeeding generations, *i.e.* it is increasing.

On further investigation of all chronic diseases that stand in close connection with the inability to nurse, it was discovered also that caries of the teeth is intimately related to it. Thus in 708 reported cases of capable women, there were 76 who had complete dentures and not a tooth in their mouths was decayed, while of 987 incapable women only seven had perfect teeth.

EFFECT OF BREAST AND BOTTLE FEEDING IN REGARD TO MALOCCLUSION.

With the object in mind of testing the probability of a correlation between artificially fed babies due to the inability of mothers to nurse them, and the prevalence of malocclusal conditions, I began to conduct a systematic investigation during the beginning of 1913. The cases recorded were obtained whenever opportunity arose, both in practice and outside, and were not confined to malocclusal conditions alone. Owing to the inaccuracy of the data collected at the beginning, a number of records had to be discarded, which diminished the collected data considerably. However, as I consider this report not to be conclusive, but rather introductory in its character, I am submitting these findings in the hope of obtaining co-operation in the further extension of the investigation.

The records up to date comprise ninety-two cases. Of these, there are eight normal and eighty-four in malocclusion; the ages ranged from two years to thirteen. Of the normal cases, four were exclusively breast-fed, and had had no bottle at any time. One was exclusively bottle-fed, one was breast-fed for nine months and bottle-fed nine months longer, and two were breast-fed for six months and bottle-fed for twelve months.

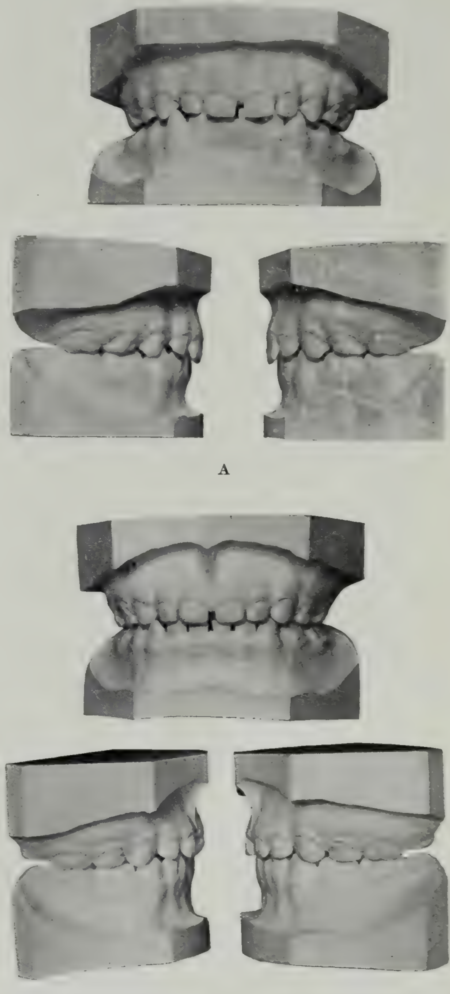
Of the 84 cases of malocclusion there were: breast-fed 16, bottle-fed 21, and breast-and-bottle-fed 47.

This means that of the 84 cases, 68 had to resort to the bottle, or 81 per cent. were not entirely breast-fed, while 19 per cent. were not bottle-fed. The reason for resorting to the bottle, as invariably given, was either an insufficient milk supply or poor quality of the milk. In the cases where breast feeding was followed by bottle feeding, the breast-feeding period varied from three days to nine months, while the bottle feeding varied from five months to five years. In the few cases where breast feeding was kept up until the ninth month, the bottle was given at least sixteen months thereafter, while in the majority of cases the bottle-feeding period was, on the average, twice as long as the breast-feeding period, and in twenty-four cases either a pacifier was used or the infant was addicted to thumb-sucking or finger-sucking.

It is evident, then, that there is a close relationship between bottle feeding and malocclusion of the teeth, as presented by these figures. I use the term bottle feeding in a sense to imply inability of the mother to nurse her infant, as this was the invariable cause given in these cases.

In an effort to find any connection between the extent of time during which the bottle is employed and the form of malocclusion developed, I utterly failed; but on limiting myself to the examination of deciduous dentitions alone, I found some peculiar coincidences. Thus, of thirty cases examined, ranging between the ages of from two years to seven, five were breast-fed and twenty-five breast-and-bottle-fed. Of the five breast-fed, three were apparently normal, and two presented malocclusal conditions. Of the twenty-five breast-and-bottle-fed, four were apparently normal, and twenty-one had malocclusions.

FIG. 7.



A

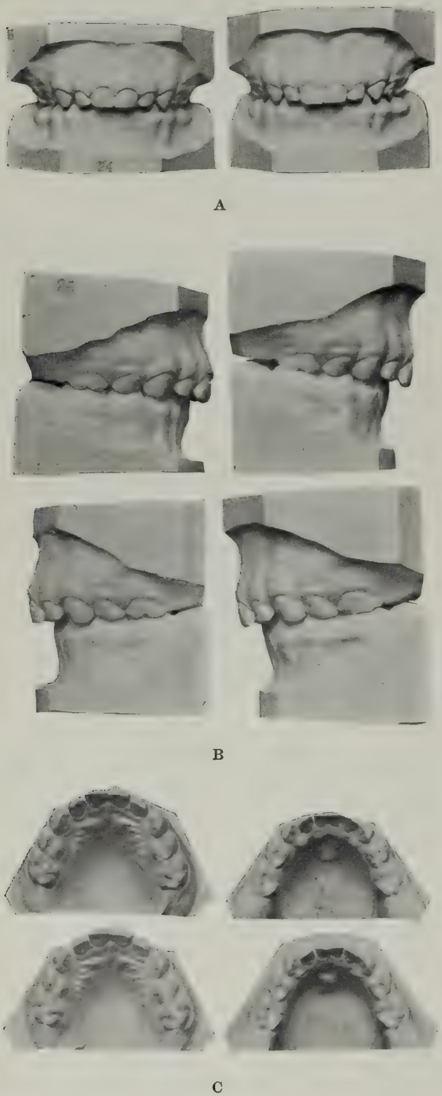
B

Showing difference of occlusion of the same mouth; apparently normal in both instances. A, At three and a half years of age. B, At four and a half. (M. H.)

In the designation "apparently normal," I mean to imply that, as far as can be judged, the teeth seem to be in normal position, but as the deciduous den-

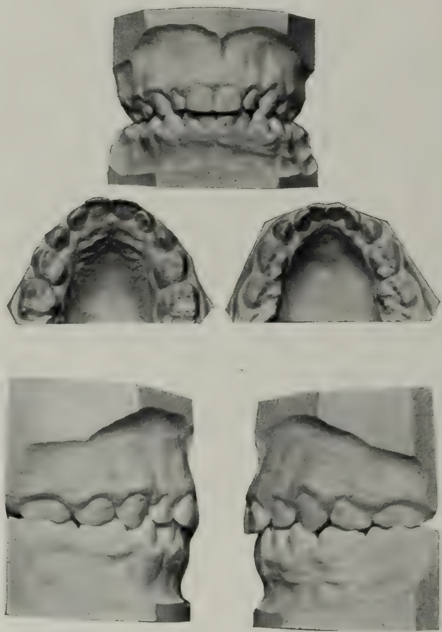
tition is a transitory organ, its condition is entirely dependent upon the normality in the development and growth of the succeeding structures; and as our present knowledge concerning these conditions is rather meager, it is difficult to say with certainty how a deciduous dentition should look at a given age, for its normal characteristics change in appearance from the completion of the dentition to the shedding of the first deciduous tooth. In Fig. 7, A and B represent models of the mouth of a child three and one-half years of age and one year later;

Fig. 8.



Excessive overbite in anterior region. Casts are of the same child's mouth at the respective ages of three and one-half and four and one-half years. (M. H.)

Fig. 9.



Narrow dental arches of a deciduous dentition, at the age of five years, due to adenoid vegetations in the nasopharynx. (M. H.)

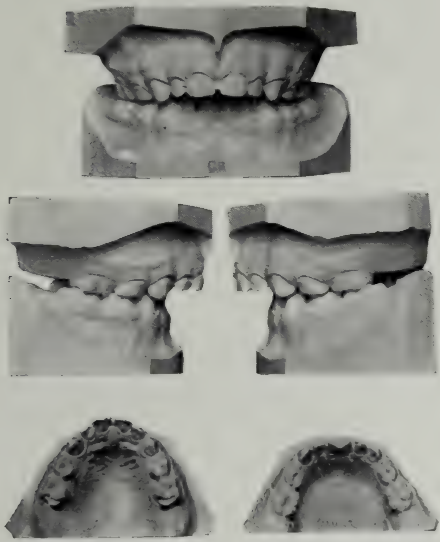
notice the difference. Although there is a marked change in the occlusion of these teeth, they are apparently normal in both instances.

Again, of the twenty-one malocclusal cases two were breast-fed, six were bottle-fed, and thirteen breast-and-bottle-fed, *i.e.* nineteen resorted to the bottle. Working now in narrower limits, it was not so difficult to find some correlation of the degree of the disturbance to the factors involved.

The average form of malocclusion pre-

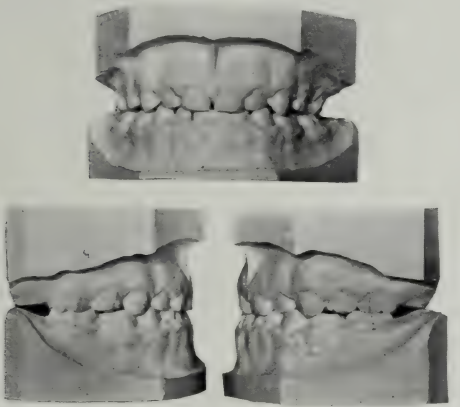
sented in the bottle-fed and bottle-and-breast-fed was mostly in a sort of extensive overbite in the anterior region (see Fig. 8, A, B, and C), of which there were fourteen. When in addition to bottle-feeding there were extensive adenoid vegetations from early infancy, complicated by mouth-breathing, there was no overbite, but a narrowing of the dental arches, as seen in Fig. 9. Of these there were three. When in addition to the bottle feeding, or the breast-and-bottle feeding, there were adenoid vegetations and a habit involved, such as thumb-sucking or finger-sucking, or a pacifier used, the malocclusion was a decided class II, division 1. (See Fig. 10.) Of these there were four; two presented a tendency to shift the mandible forward (as is seen in Fig. 11).

Fig. 10.



A marked "class II, division 1" in a deciduous dentition. (M. H.)

Fig. 11.



Showing tendency toward forward shifting of the mandible, which may be seen by the inclination of the lower anterior teeth. (M. H.)

It is not my intention to advance any theories nor to create the idea that I have discovered *the* cause of malocclusion. I simply want to call attention to the existing high percentage of bottle-fed children afflicted with malocclusion of the teeth.

POINTS IN THE CONSIDERATION OF THE PERNICIOUS EFFECT OF BOTTLE-FEEDING.

As to the manner in which the pernicious effect of bottle-feeding may leave its imprint upon the developing masticatory apparatus, it is difficult even to make a reasonable guess; but in the course of subsequent investigations it would be of advantage to take the following points into account:

(1) The average time consumed by an infant in emptying an eight-ounce bottle provided with the best nipple, having the smallest aperture, is about eight minutes. Counting an average of eight feedings per day, we find that the infant's masticatory apparatus performs sixty-four minutes of actual work in twenty-four hours. The time consumed, on the other hand, during each breast feeding, is at least twenty minutes, which makes an actual working time of one hundred and sixty minutes for the same period, as compared with sixty-four in bottle feeding.

(2) The constituents of the bottle milk may be in correct chemical proportion, but is it qualitatively as efficient as that of the normal mother's milk?

(3) The temperature of the milk in the bottle may vary in rather wide limits,

which is not the case in milk from the mother's breast.

(4) The compensatory impulses between the bottle and baby can hardly be of a nature similar to those between the healthy mother and her offspring. Compare Figs. 12 and 13.

(5) The bottle forms a movable base and renders no resistance to the sucking pull of the infant. On the contrary, if observed closely, the weight of the bottle with its contents rests on the mouth of the babe, and before the milk has been consumed, this is increased by the weight of the arm holding the bottle. The breast, on the contrary, renders a certain amount of resistance to the pull exerted. It was of interest to me to test this point, and so I suspended a nursing bottle to a spring scale, and the bottle was given to a nursing baby. As the infant was endeavoring to empty its contents, there was a pull of two ounces exerted with each sucking movement. The infant upon whom this was tried was breast-fed for about six months, and the bottle had recently been resorted to. Whether entirely bottle-fed infants would exert a similar force remains to be ascertained.

(6) The size of the rubber nipple as compared with the breast nipple is another consideration worthy of attention. A comparison of the varieties of nipples in Fig. 14 and those of the normal human breast (see Fig. 15) is most instructive.

(7) The rubber nipple yields its contents by mere compression, while the breast nipple must be compressed and extended.

FIG. 12.

The nursing mother. (From *Geographic Magazine,* March 1914.)

FIG. 13.

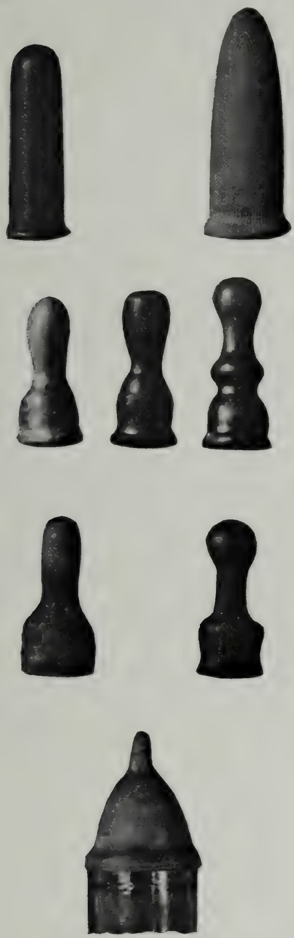
The nursing bottle. (From Dr. Kilmer's "The Practical Care of the Baby.")

(8) The base of the rubber nipple—the bottle—is hard, while the breast is of a somewhat different texture.

(9) It has recently been demonstrated that deficiency in thyroid activity would lessen the milk secretion, while increase in the supply of thyroid extract would increase it. Thus, goats were experimentally fed on thyroid extract, and they were made to yield twice the normal quantity of milk. To quote from William M. Thompson's (30) paper on the

"Influence of Thyroid Glands on Pregnancy and Lactation": "Hertogue believes that thyroid given to lactating women increases the flow of milk, and

FIG. 14.



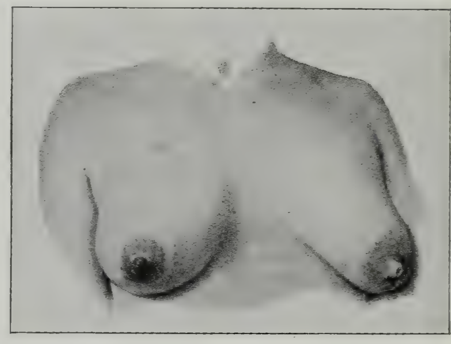
A few specimens of a vast variety of rubber nipples employed for bottle feeding. (From Dr. Kilmer's "Practical Care of the Baby" and my own collection.)

Bang states that the active principle is excreted by the milk."

"Ciullo concluded that both glands (thyroid and parathyroid) have an important effect upon lactation, citing Almagha's experiments, who removed the thyroid apparatus from young puppies, which showed no ill effects while being suckled, but when this was suddenly stopped, the animal died."

Finally, the fact that the bottle has to be resorted to would imply a disturbance in the mother's condition which must be accompanied by some consequences in the infant's nutrition during the period when the milk begins to be affected until the bottle is prescribed. To what extent the degeneration of the mother's milk may influence the infant's health is difficult to say in the darkness of our present ignorance. But that there is a disturbance present is amply brought to our notice by some investigators, and it must be attributed to improper nutrition. These disturbances may continue and develop to a degree as to present such dystrophies as rhachitis, as shown by T. Wood Clark([31]), or they may be intercepted at any stage during the course of development of the disturbance. The dystrophy of rhachitis is shown by Kassowitz([32]) to exist to the extent of 90 per cent. in infants during the beginning of the teething period.

FIG. 15.



Showing form of breast of a wet-nurse with abundant milk of good quality. (After Schlichter.)

CONCLUSIONS

To recapitulate, I shall sum up my remarks as follows:

(1) In the light of our present knowledge the problem of the *etiology of*

DIAGNOSTIC CHART.

Date ____________________

Name ____________________ **Address**

Age ____________________ **Height** __________ **Weight** __________

Diagnosis (Classification.) ____________________

Mother's condition during pregnancy ____________________

Birth (Were instruments used?) ____________________

When a baby how was the patient fed? { **Breast?** __________ **How long?** __________
Bottle? ______ **Why?** __________ **How long?** __________ }

At what age did patient begin to talk? ____________________
" " " " " " " **walk?** ____________________
" " " " **the first tooth erupt?** ____________________

Habits, when were they first observed?

Finger sucking ______	**Right or left?** ______	**When stopped** ______
Thumb " ______	" " " ______	" " ______
Lip sucking or biting ______	" " " ______	" " ______
Cheek " " " ______	" " " ______	" " ______
Tongue " " " ______		" " ______
Any other habits? ______		

Were pacifiers used? __________ **Of what description?** __________ **How long?** __________

Were the adenoids affected? __________ **Any other nasal disturbances?** __________
When were they operated upon? __________

Were the tonsils affected? __________ **In what manner?** __________
When were they operated upon? __________

What diseases has the child gone through? ____________________

Has the father malocclusion? __________
If possible, obtain models or ascertain classification ____________________

Has the mother malocclusion? __________
Same procedure __________

Are there any missing teeth? __________ **Which?** __________

Are any tooth germs missing? __________ **Of what teeth?** __________

Who of the parents or relatives have had similar missing organs? __________

Are there any supernumerary teeth present? __________ **Where are they located?** __________

Who of the parents or relatives had similar supernumerary teeth? __________

Are there any malformed teeth? __________ **Who of the parents had similar teeth?** __________
Is the child afflicted with any other disturbance? Such as disturbances of vision, speech, hearing, etc.?

When properly filled out, return to Dr. MILO HELLMAN,
40 East 41st Street,
New York, N. Y.

malocclusion of the teeth has been approached with a limited degree of scientific accuracy.

(2) As the causes of malocclusion, according to Angle, "must be studied from the basis of normal growth," it is important to direct our efforts toward a better understanding of the laws involved not only in postnatal development, but also in antenatal physiology and antenatal pathology, which are concerned with all normal and morbid processes that act upon the organism before birth, and with the effects which they produce by their action.

(3) Although a disease or a disturbance of any form represents the sum total of a symptom complex, it may appear in any of its intermediate stages of development. Its recognition, therefore, depends upon the amount of knowledge as related to the sequence of its progress.

(4) In order to increase our knowledge in that direction, we have to acquire an absolute mastery of all the probable factors that enter into the composition of a symptom complex.

(5) In order to acquire that knowledge, a uniform course of procedure must be adopted by which a co-operative common movement is to be initiated for the collection of all such data as would enhance the solution of the problem indicated above.

With that end in view, the accompanying diagnostic chart has been worked out, by which the proper recording of cases will be made possible, and the study of the various factors concerned in malocclusion of the teeth further pursued.

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TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

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(Continued from page 941.)

(V.)

CHAPTER VIII.—GRINDING AND SHAPING.

It seems desirable to point out that the subject of grinding and shaping teeth has not received that attention in the past which its importance warrants, and some of the reasons for this neglect have been already dealt with. A glance at the standard works on prosthetic dentistry serves to show that practically no reference is made to shaping the incisors, other than their cutting edge or cervical margins; and while in connection with plate work a great deal has been written about fitting single gum teeth and sections, the subject of fitting plain teeth in plate and crown work has been much neglected. On the other hand, a great deal has been said about grinding the back teeth, but it has partaken more of the nature of criticism than description. In drawing attention to this subject, an endeavor will be made to make the matter more clear, the necessity for this being more apparent with regard to the use of tube teeth and porcelain rods, as these lend themselves more readily to grinding and shaping. At the same time, it is to be hoped that the following observations will be helpful in the grinding, shaping, and fitting of plain teeth also, as the possibilities in this direction do not seem to be realized.

Before proceeding, then, to consider this subject further, it may be well to mention some of the appliances necessary, and as rapidity as well as accuracy is a matter of importance, the selection of these should receive careful attention. In the first place, choose one of the reliable makes of electric lathe, preferably one which gives variations of speed and is supplied with a variety of right and left-hand chucks to take different sizes of wheels, as where only right-hand chucks are provided much time is lost in changing from one size of wheel to another. For instance, a large wheel may be used on the left-hand chuck for rough grinding, while a smaller wheel is used on the right-hand. The Columbia electric lathe, made by the Ritter Dental Mfg. Co., and the S. S. White grinding lathe, are admirably adapted for the purpose, and it will be well to have chucks at least double the number of those provided with the lathe outfit, as this admits of the wheels being changed more rapidly.

Regarding the matter of grinding wheels, the selection of those which are best suited to our purpose is a matter of the greatest importance if the maximum amount of efficiency is to be obtained, consequently the abrasive materials of which they are composed deserve some attention.

These may be divided into two groups, natural and artificial. To the former belong corundum, emery, and certain forms of freestone. Corundum consists of crystallized alumina, the oxid of the metal aluminum, along with varying proportions of lime, magnesia, oxid of iron, and silica. It always occurs in crystals, and the forms are six-sided prisms or pyramids. The hardness of pure transparent corundum is generally given as about 9, the diamond being reckoned as 10 on Moh's scale. There are, however, differences in hardness between specimens from different localities. The best varieties contain 90–92 per cent. of alumina, but corundum of the first quality is much inferior to that obtainable fifty or sixty years ago.

The emeries which are mostly used are those found in Naxos, in Spain, and in North America, and contain from 55 to 80 per cent. of alumina colored by oxid of iron, some specimens containing as much as 50 per cent., and their hardness ranging from 7.5 to 8.

The artificial abrasives most frequently used are obtained by electric fusion at a very high temperature, and are purer than is usual with these natural abrasives. They may be divided into two groups, namely, the carbide of silicon (SiC) and the oxid of alumina (Al_2O_3). To the former belong carborundum, crystolon, and carbosolite; to the latter, alundum and several other like products. The principal materials used in the production of the carbide of silicon group are sand, coke, and sawdust, while the principal material used in the alundum group is bauxite, the purest form of aluminum oxid found in nature. The hardness of these abrasives rises to 9.5.

The particles of abrasive material are held together by either a mineral or vegetable binding material, certain clays being used for forming the bond of silicate wheels, while the bond employed for elastic wheels consists of shellac, rubber, and preparations which contain linseed oil. These latter binding materials possess special advantages, such as diminished danger of breakage from shock or irregular pressure.

On the whole the shellac bond gives the best results with lathe wheels, producing as they do a better and more even surface,* but there seems to be great difficulty in procuring any make of elastic bond wheels other than those of rubber. These are invaluable for disks, indeed thin disks of ordinary make are nearly useless, as they seldom run true for more than a few minutes, and are easily broken. A wheel which appears to be too hard will often give better results when run at a lower speed, while a soft wheel will give better results run at a high speed. Care must be observed not to use too much pressure, as excessive frictional heat is set up and there is danger of cracking the porcelain.

The question of grade as well as that of grit must also be taken into consideration, and it is one which, as far as the writer knows, has received little attention. The terms "grade" and "grit," therefore, are well worth understanding. Grit depends upon the size of the grains of the grinding material, and is indicated by a number. Thus, 80 means that the material has been passed through a sieve having 80 threads to the inch, while it would not pass through one having 90 threads. The term "grit," therefore, determines the fineness of the wheel. Ordinarily, wheels are supplied to us by the dealers as coarse, medium, and fine, but the number indicating the grit is not stated. A common method of describing them is as follows: (A) Extra extra coarse (equals 80 grit). (B) Extra coarse (equals 100). (C)

* The writer hopes to make further tests with elastic bond wheels, especially shellac, and to deal more fully with the whole subject.

Coarse (equals 120). (D) Medium (equals 150). (F) Fine (equals 220).

Grade on the other hand, denotes the degree of hardness, therefore the resistance to crumbling, and results from varying the binding material used for holding the grains together. Unfortunately there is no special grading list for dental wheels, but the letters A, B, C, D, and F stand both for the grit and grade; that is, a wheel in A grade will be, generally speaking, both coarser and softer than a wheel in F; in short, usually the finer the grade the harder the wheel.

That the matter of grade is of much importance in connection with these wheels for trade purposes is shown by the fact that in the ordinary trade catalog they are listed in at least two dozen degrees of hardness or grades—"medium-hard," "medium," and "medium-soft," alone accounting for ten grades.

It is unfortunate that the system adopted for the wheels for general trade purposes has not been followed in the case of dental wheels, as the complaints one so often hears of wheels being too soft or too hard would have less point if dentists knew they could obtain any grit desired in a variety of grades; but even although this advantage is not obtainable, excellent work may be accomplished by the use of the wheels given in the following table, in which carborundum is chosen as probably the best known:

Carborundum wheels.

Diam.	Thickness.	Grit.	Edge.
3 in.	$\frac{3}{8}$	B. Extra Coarse	Square.
3 "	"	" " "	Knife.
3 "	"	C. Coarse	"
3 "	"	" "	Square.
3 "	"	D. Medium	"
$2\frac{1}{2}$ "	"	B. Extra Coarse	"
$2\frac{1}{2}$ "	"	C. Coarse	"
2 "	3/16	" "	"
2 "	"	D. Medium	"
$1\frac{1}{2}$ "	"	C. Coarse	"
$1\frac{1}{2}$ "	"	D. Medium	"
1 "	1/8 & 1/16	C. Coarse	"
1 "	" " "	D. Medium	"
$\frac{1}{2}$ "	1/16	C. Coarse	"
$\frac{1}{2}$ "	"	D. Medium	"

*Wheels as used for ordinary engineering purposes.**

Diam.	Thickness.	Grit.	Grade.
4 in.	$\frac{3}{8}$	80	I–K.
4 "	"	100	I–K.

In addition to these, a large selection is necessary of the smaller sizes of carborundum wheels, points, and disks suitable for use in the engine handpiece or on the lathe, and to these may be added the following selection of diamond burs: S. S. W. Nos. 2, 3, 7, 8, 10, 11, 12, 14, 15, also one or two special diamond reamers. Doubtless the foregoing list appears a formidable one, and in excess of probable requirements, but as these vary greatly, as already pointed out, it is considered advisable to guide the reader in making a suitable selection even although it appears unduly large.

The lathe should be provided with a drill chuck which will take any drill or mandrel near the size of an engine bur. Thus the various stones, disks and points for the dental engine are also available for use with the lathe.

With regard to the use of the various carborundum wheels, the largest and coarsest wheel is used for rapidly cutting off large pieces of porcelain. For instance, when cutting a large tooth down to make a smaller one, the wheel 4 in. in diameter, $\frac{3}{8}$ in. in thickness, and grit 80, will cut through the largest tooth or rod with a rapidity which will greatly astonish those whose ideas of fast cutting have been confined to the use of wheels not greater than perhaps $2\frac{1}{2}$ in. in diameter, and of grit say 120–150. In this connection the question of surface speed, that is to say the number of feet or inches which the surface of a wheel travels in a given time,

* It is advisable to employ metal flanges on both sides of the larger wheels, and they should be at least one-third of its diameter. The inside flange should always be fixed or pinned, and a suitable rubber washer equal in size to the flange should be placed on each side between wheel and flange. Care should be taken that the wheel is an easy fit on the spindle. Tighten the flanges only enough to hold the wheel firmly.

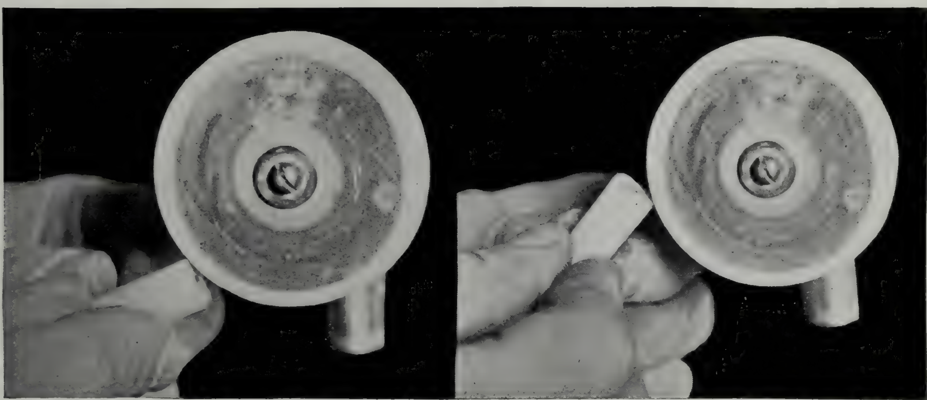
is one which seems generally to have little consideration given to it, but its importance in relation to rapid cutting will be obvious when it is remembered that a 4-inch wheel travels a distance of a little over 12 in. per revolution, that is to say it gives a surface speed of over 1200 ft. per minute on the lowest speed, while on the highest speed it gives nearly 4000 ft. per minute. On the other hand, a 3-inch wheel run on the low speed gives about 900 ft., and on the highest 2700 ft.—so that, apart altogether from grit, the amount of cutting power is about a third greater. Of course the amount of pressure put upon the work has also an important bearing upon the rate of cutting.

The use of the smaller sizes and finer grits may be left to the judgment of the operator, but he should be careful to postpone the use of these as long as possible and accustom himself to do as much as he can with the larger sizes. When one has had some experience with the latter, it is surprising to find with what accuracy and speed they accomplish the work, how quickly skill may be acquired in their use, and how much shaping up may be done without resort to the use of smaller sizes. The rate at which even these large and coarse wheels cut is much more under control than one would think possible. Certain drawbacks to their use which might reasonably be looked for will be found absent, or will only make themselves felt as the result of carelessness, such as a tendency to chipping the edges or cracking the porcelain. These defects are accentuated by defects in the manufacture of the porcelain which may be due to imperfect firing and annealing.

It is sometimes claimed for carborundum wheels that they cut as fast dry as they do wet, and that they are not liable to glazing, but this is a mistake, as water is a decided aid to rapid cutting and to the prevention of glazing. Moreover, if the wheel is used dry, the tooth held too long to it, and the wheel run at too high speed, there is danger of cracking the tooth or rod, while in addition there is further trouble from dust.

The problem of keeping wheels sufficiently wet and yet not so wet as to cause excessive sparking, is not so simple as it looks, especially when the wheel is run at a high rate of speed. With the old style of foot-driven lathe there was little difficulty, as the wheel could be run in a trough of water without much risk of sparking, or the old-fashioned device of a sponge held by the fingers or a sponge-holder did quite well, and does so still, only there are the disadvantages

FIG. 92.

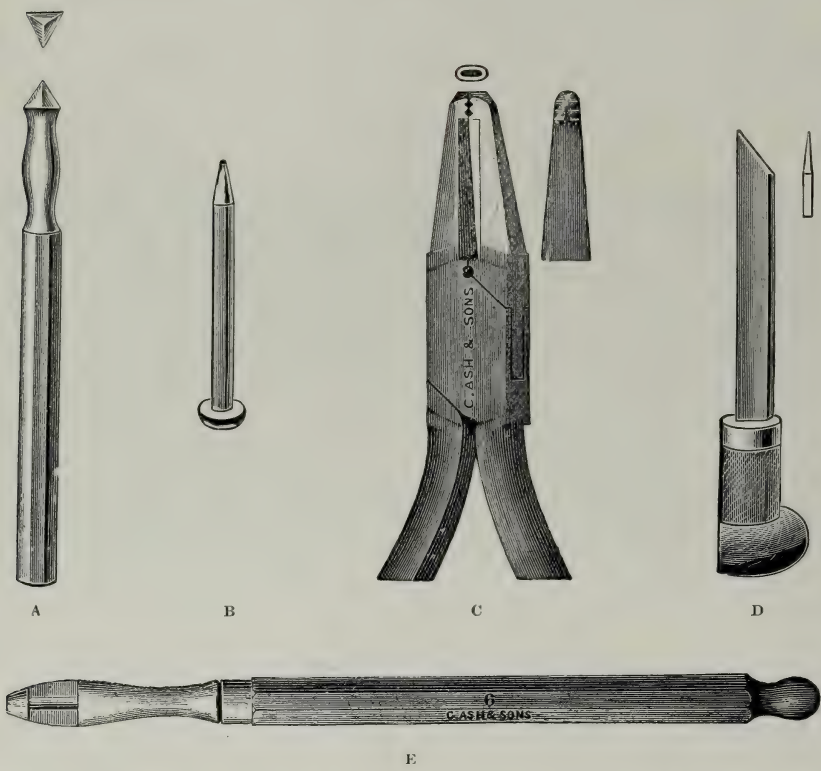


(Right way.) (Wrong way.)

associated with holding the sponge and excessive wetting of the fingers. There are several devices which do much to minimize these drawbacks, and these will be found a marked improvement, both as regards uniformity in the supply of water and also in overcoming the objections which result from the holding of the sponge with the fingers. At the same time, carborundum will be found to cut faster dry than does the corresponding grade and grit of corundum when wet; in point of fact, carborundum cuts, while corundum and emery partake more of the nature of abraders or rubbers. It would seem almost superfluous to add that true-running wheels are essential to accuracy in fitting and shaping, but some find it a great temptation to continue using wheels which have gone off the true. For this, however, there is no excuse, as there are now several excellent devices for truing up wheels.

Before leaving the subject of carborundum wheels, a warning is necessary with regard to their use, which also applies to corundum wheels used for grinding any kind of porcelain. That is, always grind toward the edge (Fig. 92), as otherwise there is a danger of splintering the tooth. This precaution must be carefully observed when using large wheels of coarse grit, but applies also to the finer and smaller wheels, although with these the danger is diminished. There are certain natural stones—mostly freestones, however—which are free from this disadvantage and possess the valu-

Fig. 93.



Shows some simple hand tools used in the work. A, Countersinker. B, Marker. C, Roughing pliers. D, Sharp-pointed graver. E, Pin-bender.

able property that the work can be presented to them at any angle without danger of chipping, but they are too slow in cutting, and are best used for smoothing preparatory to polishing.

The use of tube teeth calls for the addition of a few simple hand tools which had best be described here. These are—

(1) A *countersinker* (Fig. 93, A) for clearing away the bur which forms upon the end of the tube when ground and for slightly enlarging the orifice of the tube at its base. This is only necessary when platinum tube teeth are employed. When non-platinum tube teeth are used, Butler's points answer best. The steel countersink may be made from an old excavator handle, and should be large enough to obviate any danger of splintering the tooth by forcing it too far into the tube.

(2) A *tube file* to remove débris from the tube after grinding platinum tube teeth. This should follow the use of the countersink, and before trying the tooth on the pin.

(3) A *marker* (Fig. 93, B). This is a piece of straight cylindrical steel wire. It should fit exactly the tube of the tooth and have one end sharpened into a three-sided point. Its use is to mark exactly the position of the center of the pin-hole when the tooth is mounted. It must therefore fit the tube easily but not too loosely.

(4) A pair of *roughing pliers*. (Fig. 93, C). These have a longitudinal groove in them for holding the pin while it is being inserted in its socket in the plate.

(5) A sharp-pointed *graver* (Fig. 93, D), used in plate work for deepening the hole made by the marker.

(6) A length of *wire*—gold pin wire or dental alloy wire.

(7) A pot of *paint* made by mixing vermilion and olive oil. Too much oil makes a paint that will not readily adhere to the part to which it is applied, while on the other hand too much vermilion makes the paint thick, with the result that false marks are produced. Other pigments such as rouge have been suggested, as also a blue pencil or crayon, but on the whole vermilion will be found best.

(8) A *drill-stock and drill*. The drill must be a shade smaller than the size of the wire used for the posts.

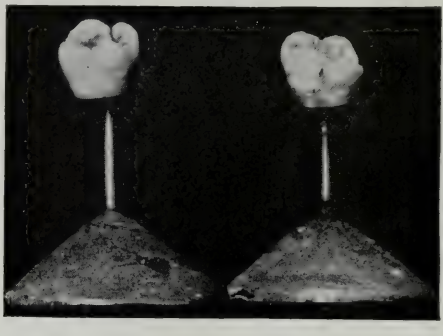
(9) A *dental engine*.

(10) A *pin-bender* (Fig. 93, E).

The respective uses of the above appliances will be described when explaining the method of mounting tube teeth and crowns.

With regard to shaping-up of teeth it has already been pointed out in a previous chapter that a sound knowledge

FIG. 94.



Shows pattern for copying from.

of the various types and forms is a great help. As an aid to the acquisition of this knowledge it is well to gather together as many specimens of typical natural teeth as possible, and when occasion arises, one of these should be selected which most nearly conforms to the type required, and this should be used as a pattern. It is surprising what help a pattern tooth affords, as one is apt to imagine he knows the exact surface anatomy of each tooth, but when it comes to cutting up a duplicate from a large size of porcelain tooth or rod, his ideas are apt to get confused. Gradually, as experience is gained, one will find it unnecessary to keep the pattern fixed always before him; but until such experience has been acquired it is a distinct advantage to have such a model from which to work (Fig. 94). Of course, a

good plaster impression is sufficient after some experience has been gained.

It has already been pointed out that while there is a large selection of the various forms of tube teeth with narrow bases suitable for most cases of plate, vulcanite, and bridge work, there are at present few of these which are large enough in the base for use in crown work, or in plate work where they have to be set on the gum, and in consequence the special forms of tube teeth or porcelain rods are frequently called for.

In order to illustrate the method of fitting and shaping a tooth or section of porcelain rod for forming a crown we shall take a case involving the mounting

FIG. 95.

FIG. 96.

FIG. 95: Base of tooth coned.
FIG. 96: Tooth on cap before grinding.

of a front tooth crown on a capped root. Having obtained a good model, the next thing is to select a suitable tooth, care being observed to note that its base is sufficiently large to cover the surface of the cap and to allow a little surplus material all around. It must in addition be of sufficient length to allow for letting down, and so call for a good deal of grinding. In order to reduce it rapidly, the largest size of coarse square-edged wheel should be employed, and the tooth ground all around its cervical edge, as in Fig. 95, until its base is reduced to a cone, which should then be truncated until a square end to the tooth is again formed, proceeding, if necessary, as before; or it may be cut through by means of a knife-edged wheel, or a deep groove may be cut around it and the surplus removed by means of a small device for this special purpose, consisting of an instrument with two chisel blades placed vertically, the upper one of which is movable. The tooth being inserted between the two blades, the portions should be severed by a sharp tap.

The fitting of the tooth to the cap requires a considerable amount of practice to do quickly and well, and it is an advantage to remove the latter from the model so that all sides can be seen with ease. The tooth should be placed on the post in the position it is to occupy, and the space noted at its widest point where it does not touch the cap (Fig. 96). In order that this point may touch the cap, grind off the porcelain from the part that does touch, and here the ordinary size of wheel will require to be used, from $2\frac{1}{2}$ to 3 inches down to the smallest size, and of such grit as best meets the circumstances. The choice must be left to the judgment of the operator, but points to be noted are that the wheel employed should be the largest that can be used without danger of grinding the base of the tooth which is already fitting, and for the purpose of rapid working it should be as coarse as is consistent with fine fitting and freedom from danger of chipping the edges of the tooth. When one has had much experience in fitting tube teeth, the unaided eye alone serves to note with accuracy the points of contact and the amount which should be ground off; but until then the rough fitting is rendered much easier by the use of vermilion paint—and for fine fitting this help is nearly always necessary. Some take exception to the use of paint or coloring matter as an aid to tooth-fitting, maintaining that these are never necessary; in tube work, however, such aid as paint affords for rapid and accurate fitting cannot with advantage be dispensed with, and it is to be observed that with tube teeth, once the post or pin is soldered, it prevents the ground base of the tooth from being marked, by rubbing it on the metal base, with the object of indicating the part which requires to be ground, as with an ordinary flat tooth.

The method of applying the paint is

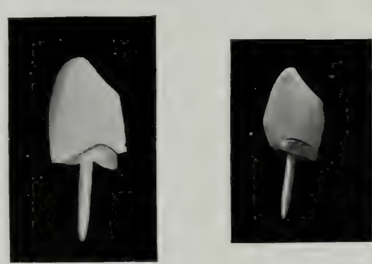
as follows: With a small brush spread a thin coating over the surface of the cap, place the tooth on the post and let it down gently until it touches; then remove the tooth, and a slight vermilion mark will indicate the point of contact. Grind this down and again try on, when it will be found to touch possibly at the same or at one or two more points. Continue the grinding and trying on until a fairly accurate fit is obtained. Care should be taken to have the base hollowed out around the tube a little more than is actually necessary, but not extending to the margins, and in addition it is well to hollow out the base of the tube slightly with a Butler's point. In the case of the platinum tube tooth the steel countersink should be sufficient for this; if dipped in turpentine it will cut more easily. With reference to the rough fitting, it is very necessary to note the direction of the tooth each time it is let down on the cap after grinding. By failing to do so it is not uncommon to have a perfect fit of the base of the tooth to the cap, while yet in obtaining this the direction may unconsciously have been altered, especially when it is being fitted to a steeply sloping surface. This applies particularly to the early stages of fitting. Such a mistake can, of course, be easily remedied if there is ample bulk of porcelain.

Fine fitting. The fine fitting is to be continued in the same manner as the rough fitting, with this difference, that smaller sizes of wheels are generally used, but, as already mentioned, the size of wheel most suitable for each case must be determined by the judgment of the operator. It will frequently be found, especially in the case of teeth with a small base, that small wheels require to be used from the first—say those of an inch in diameter and downward; generally speaking, however, the larger and more regular the surface of the cap, the larger the wheel which may be employed.

The accurate fitting of the tooth to the cap is a matter of much importance with regard to strength, and the security of attachment of post and crown. A crown may have its base and tube hollowed out to excess while the margins fit well, but obviously such a fit is a false one, obtained by excessive sacrifice of porcelain and consequently of strength. But there is an additional evil, and that is the weakening of the attachment of the crown to the post owing to the excess of cementing material necessary. Moreover, a crown accurately fitted to the cap is far less liable to the danger of rotation; indeed, this is impossible unless the cementing medium used is exceedingly poor (Fig. 97, A).

To judge the accuracy of fit, try to rotate the crown on the cap at the same time pressing upon it. If the slightest lateral movement is observed, then the crown is not fitting over its whole surface. Lastly, the marginal fit should be such that no space is visible between the porcelain and the gold cap.

Fig. 97.



A B

A, Crown fitted to cap. B, Overlapping porcelain ground off.

Having fitted the base of the tooth to the cap, the next step is to grind off sufficient of the approximal surface to allow the tooth to get into the space, and before doing this it is a good plan to trim a small portion off each of the adjoining teeth on the model, say about the thickness of a visiting card, as this will insure a margin of porcelain being left to be cut off the tooth when it is adjusted in the mouth.

The next step is the shaping-up of the tooth, and this consists in first reducing its circumference at the base until it is of a size to conform with the cap. (See

Fig. 97, B.) For this, a square-edged wheel 3 inches in diameter, ⅝ in. thick, and grit 120, or even 150, will be found most useful, as there will be less liability to chip the edges with this than by using one of a coarser grit, although it is surprising with what safety one may grind even with coarse wheels, provided the proper method is employed, viz, grinding toward the edge, as in Fig. 92.

Having thus fitted the tooth into the space, its face should next be ground so as to bring it into alinement with the adjacent teeth, care being taken to leave it a trifle longer than necessary. The art of grinding and shaping these surfaces so that they may be left smooth and free from facets is one which is much more easy to demonstrate than describe. The requisite smoothness is obtained by employing a swinging movement up and down, at the same time imparting to the tooth a slightly rotary motion. Instead of using the expression "swinging movement," it would perhaps better convey the idea to call it a rubbing movement. By this means a fine, smooth, rounded surface is obtained, and one which lends itself readily to subsequent polishing.

The lingual surface of the tooth is next to be ground to conform in shape with the adjacent teeth and to the bite. The necessary hollowing out is best done by means of a wheel about ⅝ in. diameter, 3/16 in. thick, and of coarse or medium grit, which will give approximately the correct concavity and so produce a surface free from irregularity. To one unfamiliar with the strength of tube teeth, the amount which may require to be ground off the lingual surface may appear to leave the tooth dangerously weak, but little fear need be felt on this score, as will be seen on referring to Chapter IV (see page 699, June issue).

The crown may now be considered finished as far as work on the model is concerned. The subsequent steps in the process of fine fitting should be done at the chair side, and a description of this will now be given. After the adjustment of the cap to the root, the tooth should be tried on, when it will be found to touch hard on the adjoining teeth. The points of contact should be carefully noted, and with a small flat-edged wheel in the engine these should be carefully ground off, care being taken not to remove too much at a time.

The trying-on of the tooth should be continued until perfect approximal contact is obtained. The fit, however, should be fairly tight, to allow for smoothing and polishing, as in doing so these surfaces are slightly reduced.

Next, the incisive edge should be cut to the proper length, using for this purpose a fine square-edged wheel, and the mesial and distal corners rounded according to the requirements of the case. At the same time the disto- and mesiolingual surfaces should be rounded off and reduced to a natural shape. The cingulum, too, may be shaped-up to conform with the character of the adjoining teeth. With regard to the amount of porcelain on the lingual surface, it is to be remembered that this largely depends upon the position and inclination of the post, and that this, as previously pointed out, can be controlled to a large extent; the endeavor should therefore be made to have the post directed as far forward or outward as is consistent with a due regard to avoiding the danger of its showing on the labial surface after the crown has been finally shaped up.

The foregoing general description is applicable also to the various classes of teeth and crowns already spoken of and hereafter to be described.

Naturally it is impossible to give much guidance in this matter, as it is one which does not readily lend itself to a written description, even when supplemented by illustrations. In this it shares the difficulties that attend attempts to deal with the illusive character of the technique of art; and so such endeavor as will be made to describe the manipulation of these stones for the purpose of producing those desirable natural effects must fail in completeness for the reasons given. Generally speaking, the engine will be found more useful than the lathe, not only because of its

greater flexibility, but also on account of its closer proximity to the chair and the facility thus afforded of obtaining the natural teeth as a guide in shaping up. At the same time these advantages are not always necessary, though very desirable in the case of the incisors. Moreover, a model alone will suffice for obtaining as good results as in the case of any other form of crown, and so the final fitting, shaping, and polishing may be completed without resorting to the refinements spoken of, desirable though these are in most cases.

FIG. 98.

Tailor's thimble with sponge attached.

The tooth should be held in the left hand, along with a small piece of sponge which may be attached by means of shellac to a tailor's thimble (as shown in Fig. 98), or grinding may be done dry; the stones which will be found most generally useful are those about $\frac{1}{2}$ in. by $\frac{1}{8}$ in. thick, square- and round-edged, and grits C and D—finer grits are seldom desirable—and a soft rather than a hard grade is best, as not only may the work be done faster, but more character thrown into it. These should be run at a fairly high speed, and used with a moderately fast drawing motion, grinding always toward one—making as it were about thirty to sixty draws in the minute; in short, using the stone something like a paint-brush (see Fig. 99), but, of course, very much faster, and always drawing from above downward. Another method of using the wheel and one which produces an excellent surface is to secure a rapid circular motion in a direction at right angles to the direction in which it is revolving. The motion may indeed, be described as a rubbing one. While the stone is being manipulated as described, the position of the tooth should be varied as required, and here it will be observed that greater freedom is possible than when the lathe alone is used for giving the final touches. At the same time, results almost as satisfactory may be obtained in the following manner by the use of the lathe alone, in all but exceptional cases. As only one motion of the grinding wheel is possible, and that a circular one, the tooth

FIG. 99.

Showing method of grinding.

must have its various surfaces which require shaping presented to it, and this should be done by moving the tooth up and down, and at the same time backward and forward across the face of the wheel, and the tooth should not be removed from it except for the purpose of noting the progress made.

Instead of water, vaseline may be employed as a lubricant, as this gives a finer and more even finish. The wheel should be grit C, ½ in. diameter by 3/16 in. broad, and square-edged. The description thus given may not convey a great deal, but a consideration of Fig. 99, combined with some practice, should soon make the matter clear.

Here it seems advisable to complete the description of fitting and shaping a tube tooth by describing the final smoothing and polishing which will fit it for being set in the mouth.

Smoothing and Polishing Porcelain Teeth.

This is a subject which has been much neglected, and those who have written about it have handled it in a manner which seems to suggest that they lack confidence both in the methods they advocate and the results obtained. Doubtless better methods would have been evolved under more pressing circumstances, but as our necessities have been fairly well met by an extensive selection of tooth forms, the subject failed to receive that attention which it deserves. Moreover, encouragement has never been given to interference with the labial or buccal surfaces of the teeth.

The method usually suggested is to smooth the ground surface by means of a wheel of the finest grit of corundum or carborundum, and afterward by means of an Arkansas stone, followed by a small wooden wheel or moosehide buff armed with oxid of tin or pumice powder with water. While a polished surface can be obtained in this way, the process is slow and the results are so unsatisfactory that the methods herein advocated with regard to the shaping of teeth would have been so handicapped by it as to preclude their development. Fortunately there is a method both speedy and thorough whereby this may be accomplished. It consists in smoothing the whole of the ground surface by means of a special stone, "Ash's polishing stone," a soft but tough natural stone of pale cinnamon color. These may be had for the lathe in sizes ½ to 1½ in. in diameter, and also in a variety of shapes for use in the dental engine, and known as tan-stone, though precisely the same as the former. This stone comes from Cornwall, and it is fired or baked to bring out its peculiar properties. These properties consist of smoothing and at the same time imparting a dull polished surface, and this work may be rapidly carried out after the use of even the coarsest carborundum wheel, though it is best to go over with a fine wheel first. The wheel should be run at a high speed on the lathe and kept thoroughly wet, and the whole of the ground surfaces gone over lightly and rapidly with a zigzag motion, the tooth as it were being rubbed backward and forward against the rapidly revolving stone. For those surfaces which it may be found impossible to smooth by means of the large wheel, the smaller sizes should be used in the engine. About two to three minutes should suffice for the largest size of tooth. A polish equal to new may then be given by means of a felt wheel or buff of about 2 in. diameter, kept thoroughly wet with water and fine pumice powder, and run at a high speed. The highest gloss is to be obtained by running the buff nearly dry toward the end.

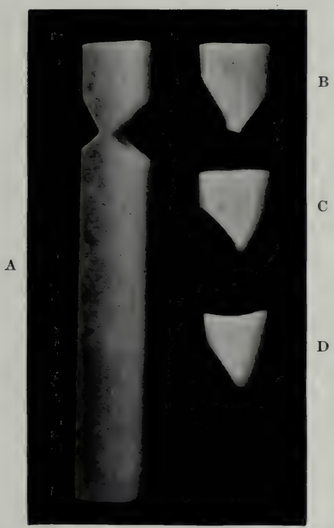
To smooth surfaces inaccessible to the ordinary polishing stone—division between the teeth for instance—thin wheels of the same material may be employed, and the final polish be given by means of thin fine string, along with pumice and water. The time necessary to perform this operation should not exceed that required for smoothing.

The Shaping-up of Teeth from Porcelain Tube Rods.

Having described the shaping-up of a front tooth crown from one of the

larger forms of tube teeth, it is now proposed to explain the method whereby a similar tooth may be formed from a porcelain rod. A porcelain rod should be selected of suitable shade and large enough to cover the cap, and for this purpose the second largest size of single-tube rod will be found suitable for all but exceptional cases. Having removed the cap and post from the model, proceed to fit the end of the rod to it in the same

Fig. 100.



A, Tube rod No. 24 with V-shaped cuts. Time making cuts, 30 sec. B, C, D, Stages in shaping-up of tooth. Total time, 3½ min.

manner as previously described, and having rough-fitted it, make two slanting cuts in the rod, one on each side (Fig. 100) which are to correspond with the labial and lingual surfaces of the crown. These should be made with the edge of the large size (4 in.) wheel, and while the cut which is toward the lingual surface should be made deep enough to reach the tube, that on the labial surface should only reach about half way. The distance of the cuts from the base and the angle at which they are made will depend upon the length of tooth required. Fig. 100 shows these cuts and the time required to make them. The tendency at first will be to cut off too much rather than too little, but the surplus can be so quickly ground down that it is well to err on the safe side. Next, separate the rough block from the rod, which may be done by means of a knife-edged wheel, or it may be broken off with the fingers or by a tap on the bench.

An alternative method is to cut off the desired section of porcelain rod before proceeding to fit it to the cap. Rough-shape it up and then proceed to fit it to the cap in the ordinary way.

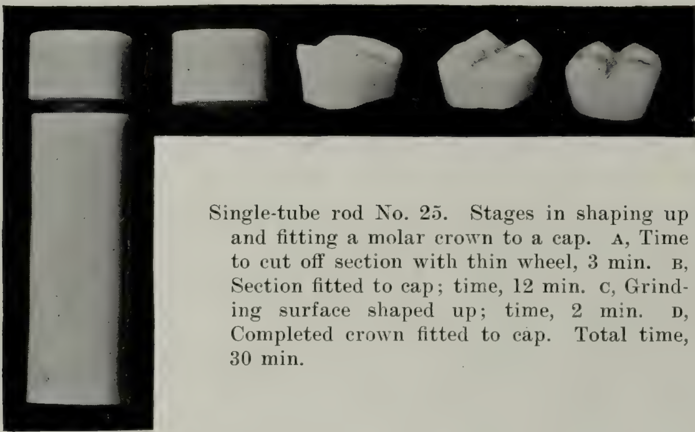
Another method is to shape up the tooth as far as is practicable before severing the connection between the partially finished crown and the rod, which latter can be used as a handle for holding the tooth during the process of shaping up, and in the case of small teeth will be found of real practical service. It has one drawback, however, and that is, by delaying the severance of the tooth from the rod, one's ideas of the true anatomical proportions of the former are apt to get somewhat distorted—and the relation of the tooth to the rod is not easily judged until one has had considerable experience. Therefore at first it is better to cut off the necessary amount of porcelain and then shape up the tooth as follows: By means of the large flat-edged wheel of 4 in. diameter, $\frac{3}{8}$ in. thick, and grit 80 or 100, shape up the labial surface in the way already spoken of in dealing with the shaping-up of a crown from one of the larger forms of tube teeth, taking care to grind from the cervical margin toward the cutting edge. The amount which can safely be ground off in the process of rough-shaping can be readily judged by the position of the tube, which, it will be remembered, should be as near the labial surface of the tooth at its incisive edge as can safely be done without the post showing through, thereby obtaining the maximum strength of porcelain.

The subsequent steps with regard to fine fitting, shaping, and polishing have already been described, and attention will now be directed to shaping up other forms of teeth.

It has been seen that, owing to a deficiency with regard to the supply of incisor and canine crowns large enough in the base for forming crowns, or for use in plate work where they have to be set into the gum, recourse has meanwhile to be had to the special forms of tube teeth made for this purpose.

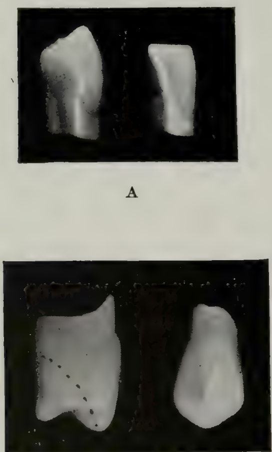
Fig. 101.

A B C D E



Single-tube rod No. 25. Stages in shaping up and fitting a molar crown to a cap. A, Time to cut off section with thin wheel, 3 min. B, Section fitted to cap; time, 12 min. C, Grinding surface shaped up; time, 2 min. D, Completed crown fitted to cap. Total time, 30 min.

Fig. 102.



A

B

A, Lateral incisor formed from tube bicuspid. B, Canine formed from the extra large non-platinum tube bicuspid.

This is no great drawback, however, once it is realized how easily and quickly a tooth or crown may be shaped up from a tooth approximating in size to the one required even when of a different type. Thus for the purpose of forming a lateral incisor crown, a bicuspid of the right color should be selected, and first ground to fit the cap and afterward shaped up as in Fig. 102, A; or the tooth may first be roughly shaped up as a lateral incisor, and afterward fitted to the cap.

Canines. Any of the upper or lower canines can be quickly shaped up from one of the special forms of bicuspids, see Fig. 102, B, where it will be seen that very little grinding is required other than removal of the lingual cusp.

Bicuspids and molars. Little requires to be said regarding these, as an ample selection will be found suitable for all ordinary cases and without the necessity for much grinding to fit them for the purpose. For crown work, and in certain cases in plate and bridge work, the special forms will be required, but for most cases of plate and vulcanite the ordinary forms of narrow-based teeth will serve all purposes. In the case of

bicuspid and molar crowns the matter of approximal contact is of the greatest importance, and must always be kept well in view. Indeed, at the conclusion of the final shaping up, the crown should require some slight pressure to force it to place before the final polishing is done, as the polishing slightly reduces it, but very slightly if done with care.

In shaping up the grinding surfaces the depths of the sulci will depend upon the bite, and they should be cut boldly by means of a fairly large wheel, and the angles subsequently rounded off with smaller wheels in the process of smoothing and polishing.

The lower teeth call for no special mention, as what has been said regarding the upper teeth applies to them also. There is this difference, however, that some of the ordinary forms of tube bicuspids which are too small in the base for the purpose of covering capped upper bicuspid roots are well suited to covering the lowers.

The Fitting and Shaping of Crowns from Double-tubed Rods.

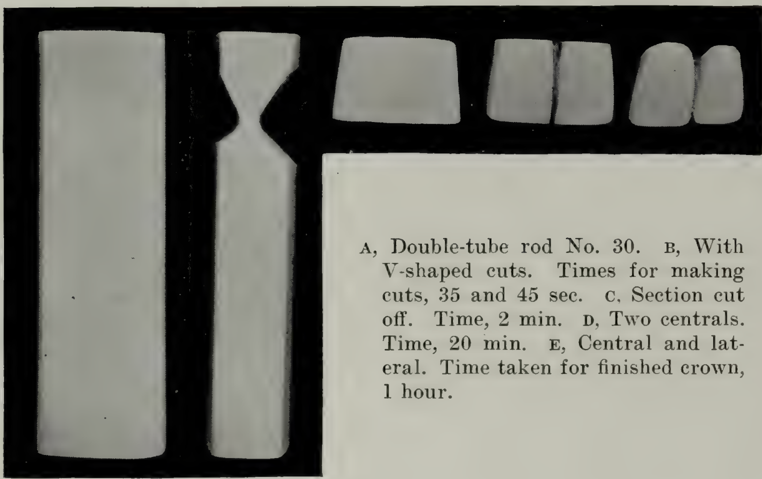
In the chapter on "Tube Teeth and Porcelain Rods," certain classes of cases have been mentioned with regard to which the employment of double-tubed rods will be found of advantage, both in crown, plate, and bridge work, and it is proposed to describe how this may best be done.

While it is evident that the difficulty of shaping two or more teeth from one block is greater than where only one tooth has to be formed, it is easily done. At the same time it must be borne in mind that the crowns cannot be treated as independent factors, but their relation to each other must receive consideration from the first. A model and bite having been obtained, and assuming the case to be one in which a right central and lateral crown are required, the first thing to be done is to select a double-tubed rod of suitable shade. The smaller of the two double-tubed rods, in which the tubes are $5\frac{1}{2}$ mm. apart, will be found to suit the majority of cases. But if the central and lateral required are extra broad, or their roots are some distance apart, then a larger size of double-tubed rod should be used, one in which the tubes are $6\frac{1}{2}$ or even 8 mm. apart. It is not to be expected, however, that both tubes can always be situated centrally in their relation to the individual caps, nor is this necessary, as that portion of one of the posts which projects above the cap has generally to be cut off to begin with, and replaced after the tooth block has been rough-fitted. As a rule, the post which is farthest from the center line of the mouth should be chosen for this purpose, and it should be replaced as near to the center of the cap as possible. With regard to fitting, the first step is to adjust the rod on the caps with its narrow end toward the central on the model, from which a small amount has been removed from the mesial surface to allow of slight fulness of the porcelain at this point, in view of final shaping up later on, and that will necessitate grinding sufficient off the base of the rod to rough-fit it to the caps in the same manner as described in fitting single tube rods or tube teeth. Having roughly fitted it, proceed next to make a double cut in the porcelain rod as described in the case of the single-tubed rod, observing to have it deeper on the lingual surface (Fig. 103), and to leave it sufficiently long to allow for shaping up. Next separate the rough block from the rod, proceed to shape up in the same manner as in the case of the single-tubed rod, giving it the necessary curve from the center of the labial surface of the block toward the cervical and incisive edges, and giving at the same time the necessary curve or sweep from the anterior approximal surface of the central to the distal surface of the lateral, the amount of curve being determined by the width of the arch, and also depending upon the regularity or otherwise of the proposed crown. If irregularity with regard to the relation of the central and lateral is intended, this should be provided for at an early stage before the incisive edge of the block is thinned down too much, and if it is intended

that the lateral should overlap the central, then a cut with a thin-edge wheel should be made, in order to define approximately the width of each tooth, and the groove should be made deeper and wider at the cervical than the incisive border; indeed, it should be quite thin and shallow toward the latter. A cut should also be made on the lingual surface of the block approximately defining the width of the teeth on that surface also. The subsequent shaping-up of the labial surfaces of the crowns will be best carried out by means of the disks and wheels shown, while the posterior approximal surface of the individual crowns will be most readily shaped by means of the beveled wheels and disks. These latter should be sharp-edged, as by their use there is less chance of dam-

Fig. 103.

A B C D E



A, Double-tube rod No. 30. B, With V-shaped cuts. Times for making cuts, 35 and 45 sec. C, Section cut off. Time, 2 min. D, Two centrals. Time, 20 min. E, Central and lateral. Time taken for finished crown, 1 hour.

Fig. 104.

A B C D

Labial and incisive views of teeth cut up from double tube rod No. 32, tubes 8 mm. apart. A, Central incisors. B, Canine and bicuspid. C, Two bicuspids. D, Bicuspid and molar.

aging the surface of one tooth while grinding the other. The process of shaping up should be continued on these lines until the crowns are shaped up ready for final touching-up at the chair side, or they may be entirely finished. With regard to the time required to fit two crowns shaped up from a double-tubed rod, it will be found that it takes no longer to do so than in the case of a single crown, for the reason that the two posts permit of the crowns being carried accurately to place without danger of their direction being altered. Fig. 103 shows some of the stages of preparation, and the methods suggested are applicable to multiple crowns formed from tubed rods, of which several examples are also shown in Fig. 104. In finishing the division between the crowns both on their labial and lingual aspects, thin smoothing wheels and polishing disks of corundum, emery, etc., will be found useful, also a thin-edged felt buff, or a string charged with pumice and water as previously mentioned. Attention is once more drawn to the value of a good model or pattern to work from, as without such aid the operator's ideas of proportion and form are apt to be somewhat confused, at any rate until he has gained considerable experience. An excellent plan is to select a pair of teeth, either natural or artificial, which will match in size and form those required, adjust them in their proper relation, and stick them together, as will be shown in Chapter X (Fig. 123). Some of the natural pattern forms of tube teeth are admirably suited for this, and best of all, of course, are the natural teeth.

Cutting off and readjusting a post. It has been seen that while it does not necessarily follow that one of these posts must be cut off, it is exceptional to meet with cases where the distance apart and necessary parallelism of the posts can be obtained without either undue reaming of the canals or bending of the posts, or a combination of these which would involve more trouble than would the replacement and soldering of a post. Consequently, a description of how this may be carried out is here offered.

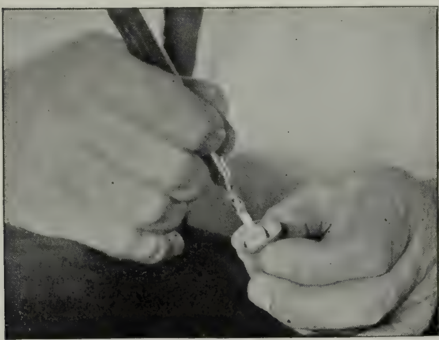
Cut off the post and grind it down level with the cap. Then adjust the block in position on the caps, and hold it there or fix it with sticky-wax. With the marker passed down through the tube, mark the position for the new post. Next pass a drill a trifle smaller than the tube down through it and drill a hole for the post. This will doubtless impinge upon the old one attached to the cap, and the hole need not be deeper than 1/64 in., while a sharp countersinker will usually form a deep enough depression. The caps and post should next be heated and sticky-wax or Parr's flux applied to unite them temporarily. The block should then be carefully tried on to ascertain that the position of the post is correct, and carefully removed in order to avoid danger of shifting the post, which should be left longer than will be required. Next, it should be invested in a small amount of investment material, a small arch of which should be formed, to secure the post being maintained accurately in position as previously described, and soldered in the usual way. With regard to time-saving, it is well to remember that very little investment material is necessary, not more in bulk than about half of the first joint of the little finger.

If reasonable skill and care have been used, the block should go accurately to place without effort.

Grinding under water. When dealing with the subject of the superiority of the tube tooth over other existing forms, it was pointed out that in the event of fracture of a ready-made crown, and also some other varieties, the tube of the tube tooth could be readily shaped to conform with the basal anchorage of the broken one, by means of Butler's carborundum points and small wheels. The trouble associated with the use of these results from the difficulty of keeping them from becoming overheated, as the use of a small piece of wet sponge does little to prevent this, and repeated dipping of the point in water is both slow and troublesome, and results in the temptation to go on grinding until there is a danger of spoiling the point. In order

to avoid this, and at the same time to do the work more efficiently and very much more quickly, the writer has been in the habit of employing a small rubber cup, in which the tooth is placed (Fig. 105) and held securely by the fingers of the left hand. These small rubber cups are known as rubber thimbles, and are used by bankers when counting paper money. The cup is partially filled with water, the amount of which can be regu-

Fig. 105.



Grinding under water.

lated by the pressure of the fingers which grasp the tooth, so that it may be kept covered during the grinding process, and uncovered by slightly relaxing the grip when it is desired to ascertain how the grinding progresses. In this manner the point may be safely run at a high speed without danger of overheating, and with a fair amount of pressure the tube may be given such shape as is desired. The method suggested will also be found useful where small stones are employed, and is particularly valuable where diamond drills, points, or disks are used, and it is to be observed that the tube in a tube tooth or porcelain rod is a very great help when a recess has to be formed; while an alternative method of procedure, in connection with the method already described, of grinding under water, is to partially embed the tooth or facing to be ground, in a mass of dental lac or modeling compound placed in and stuck to the bottom of a small metal cup which can be partially filled with water.

Incidentally it may be pointed out that grinding under water opens up possibilities which it is to be hoped will facilitate many prosthetic operations, such as forming a removable facing from a plain tooth, which may with advantage be employed in place of the S. S. White long-pin teeth, or Ash's mineral facing for dental repairs (Fig. 106). A duplicate of the latter can be shaped-up in the

Fig. 106.

Ash's repair facings.

following way in about five minutes: Select a suitable flat tooth and cut off the pin and grind, then flush with porcelain. With a very small carborundum wheel, No. 185 or No. 162, cut a groove in the center of the back of the facing, deepening and enlarging it by means of a flat-ended porte-polishing point, medium grade. To obtain the necessary undercut, employ an inverted-cone carborundum point No. 212 fine grit, reduced to about half the size. These facings are invaluable for repairs to bridges and crowns, and, in fact, in all cases in which a plain tooth has to be replaced. Of course, the pins are left in the backing, and the facing is simply cemented to place. Small suitably shaped inverted-cone points for use in the manner described may be quickly formed from a carborundum point for use with the porte-polisher.

(To be continued.)

HEREDITY.

By FREDERICK LESTER STANTON, D.D.S., New York, N. Y.

(Read before the Academy of Stomatology of Philadelphia, at its regular monthly meeting, April 22, 1913.)

An individual, be it a plant or animal, can best be studied by dividing its life-cycle into—I. History of the Soma. II. History of the Sex Cells.(8)

To prevent confusion in speaking of the sex cells—viz, the spermatozoa, ova, pollen grains, and ovules—these specialized cells found in the generative glands will be designated as *gametes*—marrying cells. The *soma,* or body, which is the result of the union of two gametes (except in parthenogenetic forms) will be spoken of as the zygote—"yoke."(1)

LIFE-CYCLE OF A SPECIES.

When two gametes unite to form a new individual, the resultant zygote must be regarded as a double structure, the component parts of which have been contributed by the gametes. When this zygote forms gametes the partnership is broken and the process reversed. Therefore we may divide the life-cycle of a species into—(*a*) A period of isolation in the form of gametes. (*b*) A period of association, in which two gametes form a zygote. (*c*) A period of dissociation, when a double-structured zygote forms single-structured gametes in its (the zygote's) generative gland.

The problem of heredity, then, becomes the determination of the relation—first, between gamete and zygote; and second, between zygote and gamete. How are the properties of the zygote represented in the gamete, and in what manner are they distributed from the one to the other?(1)

MITOSIS.

Many of the zygote's properties are observable; the differences of the gametes are not at present discernible, but as a zygote is formed of two gametes, we are in the position of attempting to decide the properties of the two unknowns from the one known. The problem to-day is an experimental one.(1) In the elaboration of the gametes in the reproductive glands, certain cytological facts must be borne in mind. Whenever a cell prepares to divide by mitosis, the chromatin of the resting nucleus, after going through various changes, divides into a definite number of chromosomes characteristic of the species. These chromosomes divide lengthwise, and as the cell divides, one-half of the chromosomes go to opposite poles, and after uniting end-to-end form the resting nucleus of the new cell. In the formation of the gametes there is a reduction of the chromatin by one-half, consequently each sperm and ovum contains but one-half the somatic number of chromosomes. In fertilization, which is the union of two gametes, we have restored in the resulting zygote the normal amount of chromatin, and in the growth of the new individual we have the somatic cells with the normal species number of chromosomes.(4)

MENDEL'S EXPERIMENTS.

In 1865, after eight years of experimental work, Gregor Mendel, a monk, published the results of his experiments

on the common pea. For thirty-five years his paper remained unknown,

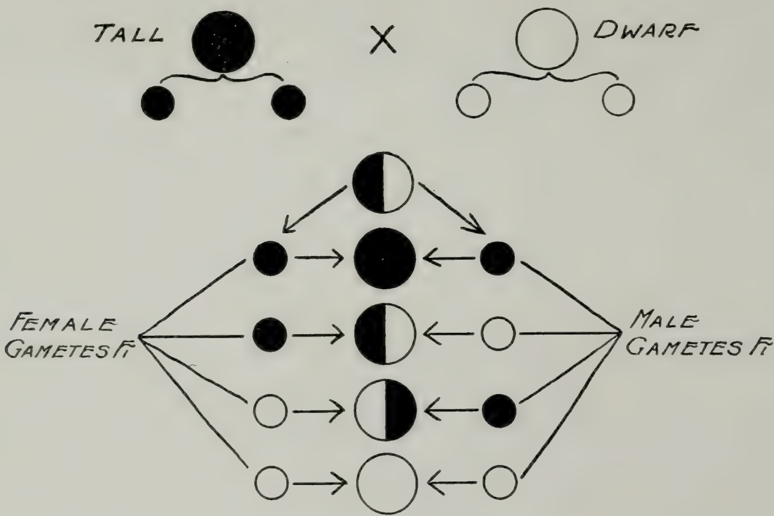
FIG. 1.

Tall pea. Dwarf pea.

until in 1900 the principles were rediscovered by three botanists—De Vries, Correns, and Tschermak—working independently. Before enumerating the characters studied by Mendel, let us examine the results of one of his experiments. The edible pea—*pisum sativum*—has two forms, the tall and the dwarf. The tall grows from three to eight feet high and requires supporting with stakes; the dwarf does not grow higher than two feet and needs no support. The dwarf pea is not simply an immature edition of the tall one, as the human dwarf is of a tall man, but it differs in a single character, the length of the internode, *i.e.* the section of the stem between the nodes or joints where the leaves are given off.(5)

Fig. 1 shows a tall and a dwarf seedling planted the same day. The dwarfness is seen to be due to the shortness of the internode. If the seeds from these plants be sown, they will breed true to the characters of tallness and dwarfness. Mendel crossed the tall and dwarf pea by artificially pollenating one with the other. Seeds were collected from individual plants and sown again, and the second generation produced three tall and one dwarf. The first hybrid generation is known as F_1 and the second as F_2. Both of the original plants, being of pure strains, form only gametes with the tall and dwarf factors.

FIG. 2.



Although the F_1 hybrid cannot be distinguished from its tall parent, still it is a different individual in its makeup, as it forms two kinds of gametes, in equal numbers, one bearing a factor for tallness and the other for dwarfness. So we may calculate what will happen when a series of pollen grains carrying their two characters alternately meet similar ovules.

From the diagram in Fig. 2 we see that there is something in a gamete that represents the tallness of the zygote, and this something is known as a factor. The factor, then, in the gamete is the something that represents the unit character of the zygote.

EXPERIMENTS IN CROSS BREEDING.

The following table will show the results of the experiments of five investigators with the cotyledon shape of the pea, and it is to be noted how closely the percentage comes to the expected three-and-one ratio.(5)

Hybrid Gen.	Round.	Wrinkled.	Per cent.
Mendel	5474	1850	25.2
Tschermak ..	884	288	24.6
Bateson	10793	3542	24.8
Hurst	1335	420	23.9
Loeb	620	197	24.1

FIG. 3.

Pea comb.

Single comb.

Walnut comb.

Rose comb.

The paired characters, such as yellow and green, wrinkled and smooth, are known as allelomorphs.(7) Mendel thought that the factors for a pair of characters existed in the same gamete, but experimental evidence has proved that this is impossible, and it has been shown that the gametes carry the factors alternately. In order to account for some experimental work, the "presence and absence" theory was evolved—namely, that the character in some instances must be considered from the viewpoint of the presence of a factor or its absence. The allelomorphs are expressed by capital letters for the character, and the corresponding small letters for its absence. So far in our crosses we have considered only a singe pair of characters—for example, round and wrinkled, yellow and green, green and white, or tall and dwarf.(7)

From the following experiments it will be seen that fowls have four kinds of combs—pea, single, walnut, and rose. If a rose-comb fowl be crossed with a pea, the result will be a fowl with a walnut comb. If the F_1 generation be inbred, it will produce 9 walnut, 3 rose, 3 pea, and 1 single. To illustrate the way the allelomorphs are expressed,

and to account theoretically for the 9 walnut, 3 rose, 3 pea, and 1 single, the assumption is made that the rose-comb fowl has arisen in evolution from the walnut by the loss of a factor, and that the pea has also arisen from the walnut by the loss of a factor, and when the rose and pea meet, they bring in all the factors that are present in the walnut comb. The allelomorphs are expressed

$$\frac{R}{r} \text{ and } \frac{P}{p}$$

The gametes that could arise from the combination of the cross of

$$\frac{R}{r} \times \frac{P}{p}$$

would be RP, Rp, Pr, rp.

For the purpose of explanation, a diagram can be made with sixteen squares, and each horizontal line of the square filled in with the above gametes, as follows: (7)

RP	Rp	Pr	rp
RP	Rp	Pr	rp
RP	Rp	Pr	rp
RP	Rp	Pr	rp

In order to show the crosses that would arise from this combination, the first horizontal line of squares is crossed with RP, the second line with Rp, the third line with Pr, and the fourth with rp, and these would represent the mathematical chances of fertilization in hybrids forming these four different gametes. It will be seen from the squares that there would be 9 walnut, 3 rose, 3 pea, and 1 single.

The next cross is an interesting one. An albino mouse is crossed with a Japanese waltzing mouse. The Japanese waltzer is unable to run in a straight line, and can only proceed by means of circles. The result of this cross is a reversion to the common gray house-mouse. If this mouse is bred, it will produce in the F_2 generation various forms, in which will be found albinos and some members with the walzing habit. (5)

In some crosses it has been found that the factor for a certain character is linked with the factor for sex. To illustrate this point: If a black Langshan rooster be crossed with a Plymouth barred hen, the result will be barred roosters and black hens. In the F_2 generation the roosters will be barred and black, and the hens will be barred and black. If the opposite cross is made, *i.e.* the Plymouth barred rooster is crossed with the Langshan hen, the roosters and the hens of the F_1 generation will be all bared; in F_2 the roosters will be barred and the hens will be barred and black in equal numbers. (7)

RP	RP RP	Rp RP	Pr RP	rp RP
Rp	RP Rp	Rp Rp	Pr Rp	rp Rp
Pr	RP Pr	Rp Pr	Pr Pr	rp Pr
rp	RP rp	Rp rp	Pr rp	rp rp

Another example of the sex-linked inheritance is seen in the crossing of sheep. (1) The Dorset sheep are horned, and the Suffolk sheep are hornless. If a Dorset ram be crossed with a Suffolk ewe, or a Suffolk ram be crossed with a Dorset ewe, the F_1 generation resulting will

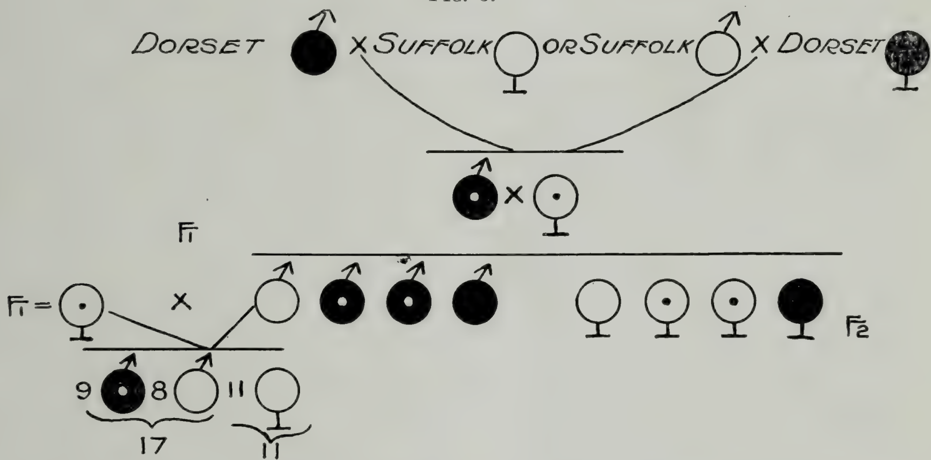
be males horned and females hornless. If these individuals are crossed in the F_2 generation, three of the males will

FIG. 4.

Horned and hornless sheep.

be horned and one hornless, and three of the females will be hornless and one horned; so it is evident that the factor for horns is linked with the factor for sex, and it is dominant in the male and recessive in the female. It is seen from this cross that if one factor for horns enters the male, the individual will be horned, while in the female both gametes must bring the factors for horns in order to have the horns appear. A nice experiment was devised to prove this theory. If from the F_2 generation a male individual which has no horns, and which therefore can carry no factor for horns, be crossed with one of the females of the F_1 generation, which although hornless carries the factor for horns, it would follow, if the assumption is correct, that all of the females of this cross would be hornless, and one-half of the males would be horned—for the reason that one-half of the males would receive one factor for horns each sufficient to produce horns, and the other half would receive no factor for horns, and consequently would be hornless. The same would result for the females, and as only one factor could be present in any individual, the total number of the females would be hornless. As the result of this cross there were 17 males and 11 females; all the females were hornless, 9 males had horns and 8 were hornless.(1)

FIG. 5.



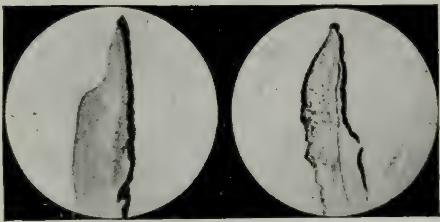
Black individuals are horned. Black-dot-and-white-spot individuals have only one factor for horns.(1)

MENDELIAN INHERITANCE IN MAN.

Brown eyes are dominant to blue, therefore blue-eyed parents can never have brown-eyed children, but two

brown-eyed parents may have one blue-eyed child in four, provided one grandparent on both sides had blue eyes. The difference between the so-called brown or dark eyes and the blue is merely a matter of pigment(1) on the front of

Fig. 6.



A B

A, Indicates blue iris. B, Brown iris.

the iris, as indicated in Fig. 6, B, compared with the blue eye as shown in Fig. 6, A.(1)

The next illustration, Fig. 7, shows a hand afflicted with brachydactyly, or the loss of bone in the fingers, as compared

Fig. 7.

with a normal hand. Brachydactyly is dominant to the normal.

What, then, is the bearing of Mendelism on dental problems? The two principal factors of evolution are heredity and variation. Variation in animals and plants is often treated by writers as a single phenomenon, when in reality it is of two varieties. If we examine any character common to a group, such as stature in man or size in peas, we shall find that they vary in a constant manner, and this variation can be expressed by means of curves according to the laws discovered by Quetelet. This form of variation is known as fluctuating or continuous variation, in contrast to discontinuous variation or mutation, *i.e.* changes occur suddenly in plants or animals by the sudden addition or loss of a character.

DARWIN'S THEORIES ON THE ORIGIN OR CHANGE OF SPECIES.

Darwin attempted to account for the origin or change of one species into another, and relied on the findings of breeders. Darwin changed from one side of the argument to the other, as to whether continuous or discontinuous variations were the factors upon which natural selection acted. The followers of Darwin and the theory of selection, as a rule, believe in the creative power of selection acting upon fluctuating variations.(9)

De Vries' experiment with the evening primrose, and the endeavors of experimental biologists, by selecting the end individuals to transcend Quetelet's curve, have led them to conclude that evolution is brought about by mutation, and is not concerned with fluctuating variations.(7)

Animals and plants are not changed in this or that part in order to become better adjusted to a given environment, as the Darwinian theory postulates. Species exist that are in some respects very poorly adapted to the environment in which they must live. If competition were as severe as the selection theory assumes, this imperfection would not exist. In other cases a structure may be more perfect than the requirements of selection demand. It must be admitted, therefore, that we cannot measure the organic world by the measure of utility alone. If it be granted that selection is not a molding force in the

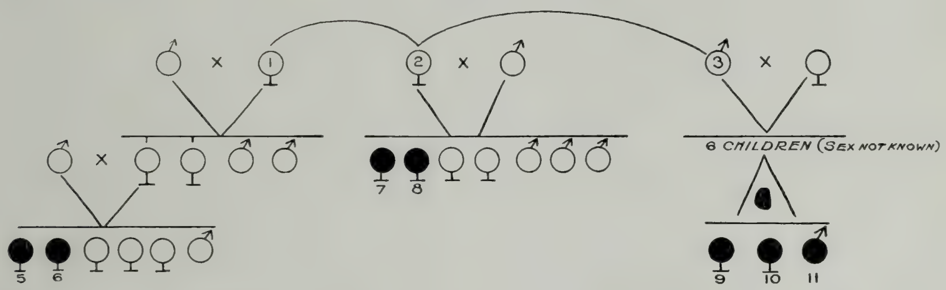
organic world, we can more easily understand how both less perfection and greater perfection may be present than the demands of survival require.

If we suppose that new mutations and definitely inherited variations suddenly appear, some of which will find an environment to which they are more or less fitted, we can see how evolution may have gone on without assuming that new species have been formed through a process of competition. Nature's supreme test is survival. She makes new forms to bring them to this test through mutation, and does not remodel old forms through a process of individual selection.(3)

we are treating, and through them gather evidence of such gross deformities as the loss of the upper lateral incisors. The chart in Fig. 8 will show how the missing laterals have been transmitted in one of the families I have under my care.

Are these variations continuous or discontinuous? Are they transmittable, and, if they are, in what manner are they transmitted? Other variations of the teeth that may be interestingly studied are the extra lingual cusps on the upper first molars, extra lingual cusps on the second deciduous molars, and the presence or absence of the fifth cusp on the lower first molars.

FIG. 8.



Nos. 1, 2, 3: A brother and two sisters. Nos. 5–11: Individuals with missing superior laterals, descendants of No. 1, 2, or 3.

MENDELISM IN ITS BEARING ON DENTAL PROBLEMS.

In view of the above evidence based upon experiments, how shall we view the variations in the teeth of man as presented to our daily notice in the mouths of our patients? Shall we continue to attribute the loss of the upper laterals in civilized man to degeneracy of the jaws due to their lack of use, or shall we look upon it from the viewpoint of the Mendelian as a definite mutation with no reference to its bearing on utility? While it is not possible to verify our knowledge with experimental breeding with the human being, we may build fairly accurate charts by examining the parents of the children whom

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A PECULIAR CASE OF ROOT ABSORPTION.

By JOSEPH H. KAUFFMANN, D.D.S., New York, N. Y.,

AND

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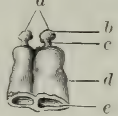
THE accompanying illustration shows the peculiar condition of an abscessed upper right first bicuspid reduced by caries which the writer removed from the mouth of a man of about sixty years of age.

There are two roots, and at the apex of each is a fine tubular appendage resembling at first glance cementum. Each of these little tubules has a round nodular end, or head as it were, and in the center of each nodule runs a fine



a, Perforations through nodules. *b*, Nodules. *c*, Tubular appendages. *d*, Roots. *e*, Orifices of root-canals. (Enlarged.)

perforation, resembling the ending of a root-canal. Some might call it a simple case of resorption of root tissue, but this does not appear to be the case, because the roots proper seem to end normally at the beginning of the tubules, and besides, there is no roughness—the usual evidence of a resorbent process or of erosion. The writer personally considers the condition to be due to one of the following three factors:

(1) A tumor-like growth due to irritation of the apical tissue, and the laying-down of an excessive amount of tissue upon the pulp branches leaving each root;

(2) Calcification around the apical pulp branches, also due to irritation and consequent excessive growth; or

(3) A peculiar condition which is simply a freak of nature.

The foregoing communication was submitted by the editor of the DENTAL COSMOS for an opinion to Mr. A. Hopewell-Smith of London, who made the following report:

Report on Dr. Kauffmann's Specimen.

EXAMINATION OF A PORTION OF AN UPPER RIGHT FIRST PREMOLAR OF A MAN AGED SIXTY YEARS, REMOVED FROM THE MOUTH ON ACCOUNT OF A SUPPURATIVE PERIOSTEITIS WHICH HAD RESULTED IN AN ALVEOLAR ABSCESS.

(1) *Measurements.* The root of this tooth, the crown of which had been lost as a consequence of caries, measures 6.5 mm. in the bucco-palatal diameter, and 3.5 mm. in the mesio-distal direction. The buccal root measures 8.75 mm. in length, and the palatal 5 mm. in length. All these are shorter than what obtains on the average in this tooth.

(2) *General appearances.* The specimen is dry, and is organically discolored, a dark brown shade showing the chief signs of necrosis of the cementum and dentin. Some thickened dead periodontal membrane is adherent in places, and a film of dry blood-clot is found over the extreme end of the buccal root. The coronal portion is cupped and excavated by dental caries, and presents the orifices of the two root-canals. Its marginal edges are clean-cut.

The two roots are united by hyperplastic cementum almost throughout their entire length.

At the apical part of the buccal root and at its center exists a long-drawn-out column of hard tissue, obviously composed of dentin, which extends 2 mm. from the absorbed portion of the root. It is tubular, and at its free extremity the apical foramen of the root-canal is seen, and is at once noticeable on account of the fact that it is filled with pulp and other detritus. It is somewhat enlarged into a nodular process.

The apical portion of the palatal root is missing. Here the dentin is lighter in color than elsewhere, and has a sharp surface, as if a fracture of the extremity had occurred. From a drawing sent by Dr. Kauffmann it would appear that this palatal root originally possessed a tuberosity similar to that on the buccal side, but this has become detached in the specimen during or before the time of transmission through the post.

(3) *Remarks.* The specimen probably represents an excellent and somewhat remarkable type of absorption or resorption of tissue, which is a frequent accompaniment of chronic dental periosteitis, especially if associated with the production of pus. There are evidences of the deposition of hyperplastic cementum on the periphery of both roots, which is more pronounced on the buccal side.

In the absence of a microscopical study of the tissues, it may safely be assumed that the tubular portion with its rounded tuberosity is the original dentinal sheath of the radicular pulp canal, which has withstood destruction by the myeloplaxes of the inflammatory tissue. The reaction by the pulp to injury is well known. It is likely that portions of the radicular pulp possessed the vital powers of physiological resistance to disease, lost by the greater part of that organ generally, on account of the effects of dental caries and the ensuing suppurative conditions of the neighboring parts. The nodular expansion represents, probably, the original free apex of the root, the cylindrical intervening territory having been absorbed by the periosteitis.

(4) *Theories as to the nature of the pathological conditions.* It has been suggested by Dr. Kauffmann that (*a*) "A tumor-like growth due to irritation of the apical tissue had produced a laying-down of excessive tissue upon the pulp branches leaving each root"; or that (*b*) "Calcification had taken place around the apical pulp branches, also due to irritation and consequent excessive growth"; or that it is (*c*) "A peculiar condition which is simply a freak of nature."

It is hard to conceive that a new-growth, whether innocent or malignant in character, could produce such a symmetrical result. A so-called granuloma, a mass of granulation tissue, which is an inflammatory neoplasm, frequently excavates the cementum and dentin of the roots of teeth in a localized position. It is not known how other tumors would act in similar circumstances.

Calcification around nerves can only take place when they run in bony canals, and issue from the base of the brain through such apertures, as, for instance, the foramen ovale or the stylo-mastoid foramen. But in these cases there are no inflammatory causes.

It is improbable that the specimen is a freak of nature, inasmuch as it obviously bears marked traces of an inflammatory affection.

The conclusion to which one arrives, therefore, is that it is a case of absorption of the apices of the roots of the tooth, accompanied by an undue reaction of living pulp tissue still remaining in the radicular canals, which has resulted in the retention, to the last, of the dentin immediately ensheathing that living tissue.

THE TECHNIQUE AND APPLICATION OF A NEW METHOD OF MAKING REMOVABLE CROWNS.

By U. E. HEDDY, D.D.S., St. Paul, Minn.

THE use of removable bridges in extensive cases of restoration has increased rapidly, as experience has proved. A great many failures of stationary bridges of the more extensive types have given much food for thought, and through these failures we have been able to devise new and more scientific methods of placing large and difficult crown and bridge restorations.

FIG. 1.

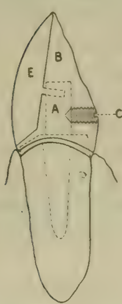


FIG. 2.

FIG. 3.

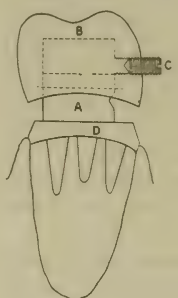
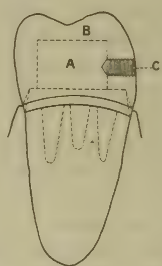


FIG. 4.



In this paper it is my purpose to describe as briefly as possible the construction of a new, efficient, and simplified method of making a removable crown. It can be applied to the so-called Richmond crown in either the anterior or the posterior region of the bridge, without interfering with the anatomical lines of the tooth or crown.

DETAILS OF CONSTRUCTION.

The principle employed in this attachment has long been used in many forms of mechanical appliances. Years of experience have proved it to be simple of construction, yet highly efficient in utility. Its application and use in bridge work in a modified form will be explained in detail.

Fig. 1 shows in outline how a finished canine or central incisor appears from the mesial or distal aspect. Fig. 4 represents the completed molar, the set-screw C being screwed through the buccal surface of the crown so that its head is always flush with the surface of the crown. The point of the screw must accurately fit into the slight depression in the cast-metal restoration marked A in the diagrams. In Fig. 1, E is the facing, and B represents the crown of the tooth, as does B in Fig. 4. In Fig. 1, A (into which the screw sets) corresponds to A in Fig. 4.

The size of the coping, A, will always vary according to whether the removable crown is intended for an anterior tooth, a bicuspid, or a molar. If it be a molar crown, we can make the cope as large as possible, so as not to interfere with the proper number of threads proportionate to the diameter and length of the screw. The cope in the molar or bicus-

pid may be made of pure silver that has been cast from the wax model. The cope or restoration is securely soldered or cast to the bands and cap labeled D in Fig. 3.

In the anterior crowns, the cope A is always made of clasp metal or iridio-platinum, of either 13 or 14 gage (Sharpe & Williams). Its length is carefully proportioned according to the length of the crown and must not interfere with the natural fulness of the lingual contour of the crown when soldered in place. In cases where platinum-pin facings are used, the diameter of cope A must in each case correspond to the width between the platinum pins of the facing, care being taken to select teeth with pins wide enough apart, so as to accommodate at least a 14-gage cope.

It is well to note in Fig. 1 that the cope is carefully placed, especially in regard to the distance between the facing and the lingual contour of the crown. This is of extreme importance, for here we must provide for the proper thickness of the gold into which the screw is set.

It should be mentioned here that, by experience and for convenience, it has been found that iridio-platinum wire of No. 13 gage, threaded with a No. 1–56 die plate, gives a standard size screw which will meet the requirements for anterior as well as posterior crowns. In connection with this, a No. 53 drill must be used to tap the crown at the proper point which has been previously marked in the wax model of the crown, or rather a small size graphite point is inserted in the wax before casting. This is done in order to facilitate drilling the hole in the gold in the proper direction. This hole then is threaded with a No. 1–56 tap. The threaded wire is now slightly pointed in the lathe, its point to fit the facet as shown in cope A when screwed into place, as in Fig. 4.

The screw has a small slot as shown in Fig. 3. This is made by a fine jeweler's saw. When it has been screwed in place, it must appear as in C in Fig. 3.

The finished crowns or bridge abutments are coated on the inside with thin chloro-percha and then set to place over the caps on the roots, after which the screw is turned to the proper position, as shown in Fig. 4, C.

ROOT PREPARATION AND CONSTRUCTION OF BANDS.

The question as to the proper preparation of the roots and bands arises. In no case should the tooth be cut off beneath the free gum. (See Fig. 2.) The enamel must be entirely removed, plus a gradual bevel of the peripheral dentin. This is clearly shown in the root preparation in Fig. 2. Two bands are used to restore the gingival contour. Great care must always be taken, especially in this operation, to conform to a law of compensation. This pertains to the accuracy with which we supply the artificial gingiva in gold or platinum. The first band, which is of 30 gage, is cut slightly on the bias and made to fit the root-bevel. Then a cap is soldered to it. Next the roots are reamed and dowels fitted; these in turn are soldered to the band and cap. We are now ready to take the measure of the second band so as to make a new and heavier band, of either 29 or 28 gage. This band must fit fairly tight over the first band so that it can be swaged on the root, down to the gingival line of the first band. After fitting in place, these bands are removed from the root, and 22-karat solder is flowed in between them. This makes a very rigid cap with the pins attached. (See D in Fig. 2.) The cap D must now be beveled on its circumference. The first bevel, marked X Y in Fig. 2, represents the part of the cap that is to fit into the crown, marked B in Fig. 3. Attention is called to the dotted lines in Fig. 3, in crown B. It is shown here how the inside of the crown fits the bevel of the cap, and how it will rest upon the cast restoration A, when it is let down to its position as shown in Fig. 4. Here the screw has been turned to its proper place.

In Fig. 2, Y Z represents the gingival bevel of the cap. The first band must always fit the bevel of the root from

the gingival to the occlusal border; thus, when the second band has been soldered to the first and beveled as described, the gingival contour and peripheral thickness of the cap is clearly shown by the angle X Y Z in Fig. 2 (cross section).

ADVANTAGES OF THE REMOVABLE BRIDGE DESCRIBED.

For the application of this method of removable crown work we can find many and varied instances. The instability of natural roots employed as bridge abutments and piers renders it rather problematical in many large restorations to know what class of bridge work we should select. For instance, in a bridge of three or more abutments, we are apt to have complications in securing parallelism. The proper cementation of such a large stationary bridge may cause some future failure, due to not getting all the crowns up to the proper place on the roots.

In this removable bridge the failure of one abutment does not necessarily mean that the whole bridge will have to be made over. It simplifies the process of repair. It relieves anxiety. We know that the entire bridge can be removed by taking out the screws, thus making it possible to repair or remodel the restoration by the addition of one or more crowns, or possibly assembling a new bridge to the old bridge to increase the anchorage and strengthen the entire bridge.

Some roots are of questionable character, and yet we prefer to retain them in the hope of using them as piers for a stationary bridge. If, for instance, one root is to be used as an end abutment of such a bridge, and either its intrinsic or extrinsic condition is somewhat unfavorable, while yet it has served many years and is still comfortable, its use as such abutment had better be precluded, the operator feeling that the whole stationary bridge would not last much longer than its weakest abutment.

To extract such a root is not always good practice. It may involve new difficulties, necessitating a new plan of operation. It may cause much absorption of adjacent tissue, and this might have a tendency to curtail the longevity of the few remaining abutments.

It is reasonably safe to proceed with the removable method as described, because we can better plan for the future of the bridge. This is of paramount interest, if we bear in mind the instability of roots, especially when subjected to new and increased forces of mastication, and we must always look ahead as to the tendency toward pathological changes that may occur. The aforesaid changes and conditions must then be provided for in the plan of the whole mouth.

The abutment roots of a removable bridge are made more accessible to hygienic treatment, and they can be given individual care without having the bridge in place. Likewise, the bridge is easily taken off, and any repair or additions to it can be made in the laboratory.

Another important advantage of this crown is the following: If, for instance, a lower first molar is to be crowned, in a mouth in which the posterior teeth will probably have to be extracted in a year or two, by placing a removable crown on that molar we can use it as a future abutment or put an attachment on it for a removable bridge. Thus we do away with the waste of time and money involved in the tedious removal of the old crown, which in nearly all cases cannot be used in the new bridge, owing to distortion, mutilation, and lack of fit.

There are, then, many good reasons why we should employ the removable principle in difficult and precarious cases of bridge work. The drawings show that the screw holds the crown in place without tension on the threads. The type of screw used is simple and strong, and owing to its method of application it is virtually concealed in the gold. When carefully planned, it is neither *countersunk* nor does it *project* from the surface of the crown so as to interfere in any way with the forces of mastication or

the freedom of the tongue or the proper anatomical form of the crown. The size of the screw is standard for all cases.

CONCLUSION.

This method has its main virtue in the fact that the screw attachment can be completed by any dentist in his own office in from five to ten minutes. I have used this method for about five years in many difficult cases with much satisfaction. Its simplicity and efficiency have appealed to many painstaking operators, who have adopted this method of removable work in their extensive practices, and their interest and success in it have been so highly gratifying that this principle deserves a more extended adoption.

We must recognize that the removable principle offers great possibilities for its application in bridge work, and it is hoped that this presentation will give an increased stimulus toward the application of removable bridge work, for the patient's as well as the operator's benefit.

A CONTRIBUTION TO THE TECHNIQUE OF ADJUSTING AND MODIFYING THE NEW APPLIANCE.

By ROBERT H. W. STRANG, M.D., D.D.S., Bridgeport, Conn.

(Read before the Alumni Society of the Angle School of Orthodontia, New London, Conn., July 30, 1913.)

THE development of a perfect technique in the use of the new appliance must be the result of practical experience in the hands of many operators. My only excuse for writing this paper is the hope that it may stimulate discussion from which will be gleaned facts that will help the more quickly to establish such a technique.

The fundamental principles upon which the writer has endeavored to build his own personal technique may be classified under three heads:

(I) The primary adjustment of the arch wire should be along lines as simple as possible, and should contain as few variations from the plane determined by the position of the buccal tubes as is consistent with the malocclusion in the case at hand.

(II) The form of the arch wire after its primary adjustment is to be considered as most sacred, and altered only when enough time and thought can be given to make the procedure positive and accurate.

(III) As no accurate changes can possibly be made without fixed indices as guides, such indices must be provided before alterations are begun.

Let us now consider each one of these principles more in detail and along analytic lines.

(I) THE PRIMARY ADJUSTMENT OF THE ARCH WIRE.

Dr. Angle has covered carefully in his two papers the technique of arch adjustment, and it is not my intention to trespass upon that ground. There are, however, certain details that experience has shown to be of considerable practical importance, and there are certain variations from his adjustment that have been suggested by other operators that furnish material for discussion.

Plane of the buccal tubes. If we stop to analyze the function of the buccal tubes we will note at once that they not only serve as retainers for the threaded end sections of the arch, but also posi-

tively determine the direction of force exerted upon the anterior teeth when the nuts are tightened. This is very important and should always be taken into consideration when determining their position. If the anterior teeth are to be moved labially without elongation or depression, the buccal tubes must be placed so as to parallel the existing plane upon which the occlusal edges of these teeth now rest.

If it is advisable to elongate the incisors as they are moved forward, then the buccal tubes should be tipped downward. This will transmit a downward force to the teeth attached to the arch, even though the arch must be bent upward anterior to the tubes to reach the proper height on the anterior teeth. The buccal tubes should never be adjusted so as to produce an upward pressure on the incisors, provided these are also to be moved labially, for such a force would render this movement very difficult to accomplish and would decidedly jeopard the stability of the anchor teeth.

Simplicity in arch adjustment. In the adjustment of the arch there should be just as few bends, loops, and curves as is consistent with the malalinement of the teeth upon which the appliance is placed.

Some operators have advocated placing loops in the region of the cuspids or bicuspids, probably with the thought that these were necessary in order that there might be enough length to the arch when the normal was approached. This procedure I believe to be absolutely wrong. In opening a loop to elongate an arch or in closing a loop to shorten an arch it is practically impossible to acquire such skill that the relationship as expressed in lines of force between the anchorage and the various other points of attachment is not changed in more directions than the one desired, and without knowledge thereof. Hence such a procedure is nothing more than guesswork, and should never be used by the conscientious operator.

In making this statement I fully realize that I condemn all forms of molar attachments that do not provide for arch elongation from anchorage to anchorage in a simple, positive, and scientific manner. This I strongly desire to do, for I believe that such attachments as the Young-Angle lock and similar devices have no place on appliances requiring such elongation. These attachments are ideal for the working retainer, but should give way to the screw end section, as originally suggested in the corrective appliance.

Under the discussion of loops in the arch wire comes the method of procedure when the operator wishes to obtain sufficient space for missing laterals or desires to close a space between two teeth, such as the centrals in frenum cases. Are not loops necessary and practical here? I believe, only under certain conditions, *i.e.* when there is but one point of attachment on each side of the loop and the form of anchor attachment is the screw end section. To use such loops with an anchor attachment of the Young-Angle lock principle, requiring most delicate adjustment of male and female parts in several planes, necessarily renders readjustment after loop-changing decidedly inaccurate, and therefore radically wrong. Personally, I prefer, in cases where such spaces are to be created or obliterated, to accomplish this by changing the position of the pin on the arch wire. The technique of this procedure can be mastered so that the most delicate and accurate adjustments can be made, and each tooth be moved to just the position that it should occupy without affecting the position of any other teeth.

(II) THE FORM OF THE ARCH WIRE AFTER ITS PRIMARY ADJUSTMENT.

It may seem absurd to many that the word sacred is used in connection with this little piece of gold wire. However, I feel that no other word so fully expresses the correct attitude that one should assume toward the perfectly adjusted arch as does this, and until one can place himself in this attitude he has

not developed to that stage where it is safe for him to adopt the new method of treatment.

The day should be past when in a hurried, thoughtless moment an operator, posing as a scientific orthodontist, removes an arch from the mouth, quickly gives it a bend here, a twist there, and jams it back into position again. I say that day "should be past," but I ask you frankly, Is it? No! In the crowded hours of many a practitioner that very thing is happening to a greater or less degree, and it is wrong; yes, it is malpractice, and the shame of it is that little children are the victims.

We are working upon delicate structures, highly sensitive, and susceptible to the most minute changes in their environment. These are tissues so beautifully adapted to our use that they become wonderful workers under the proper stimulants, asking only that this stimulation be kept within the physiological limit. I deem it one of the greatest privileges of this meeting to be able to study once more through the microscope and under such a competent teacher as Dr. Noyes, these structures, first in the normal state and then in the transitional stage as they respond to a force applied within the physiological limit. Further, to be able to compare the normal resting tissue and the normally stimulated tissue with corresponding structures in a pathological state as a result of injury. Let us fix these three phenomena strongly in mind. Let them sink deeply into our very souls, that we may be physiological toothmovers and not producers of pathological lesions.

Pain and soreness in moving teeth are pathological symptoms, and will rarely be noted in the patients of the careful operator. Such an operator requires time, and there is no one so skilful as to be able to make delicate and accurate adjustments in a brief sitting. The man who has too large a practice to take time for each individual patient is a failure as an orthodontist. He may be a good financier, but a poor example of a scientific operator.

(III) FIXED INDICES MUST BE PROVIDED BEFORE ALTERATIONS ARE BEGUN.

At the session of last year the writer introduced a partially completed instrument the object of which was to furnish an accurate method for recording the form of the arch wire, and to determine the direction of force as produced by changing its shape. Since that time this instrument has been completed, as many of you know, so that by its use it is now possible to control accurately each individual tooth movement by a known alteration in the position of the corresponding pin as related to the points of anchorage.

The absolute necessity of such an instrument seems obvious. Dr. Angle, in the paper in which he first presented this appliance to our society, stated most emphatically that its object was the bodily movement of teeth in response to a force "so gentle and so evenly distributed as to stimulate normal cellular activity and growth of bone." To obtain this "gentle and evenly distributed force" by guesswork is crude, unscientific, and hopeless, while to establish it in an accurate, scientific, and positive manner is beyond the ability of the unaided eye or hand. To render this possible the archograph was devised.*

Heretofore the method of measuring any changes made in the arch has been to place the pins, after bending the arch, alongside of the little tubes in the mouth, and with the eye to gage the change. In this procedure one great fundamental fact has been forgotten: *The point of anchorage in the new appliance as well as the old is at the distal ends, and the relationship that every part of the arch bears to these points of attachment governs tooth movement.* While the teeth in the front of the arch may be made auxiliary anchorages by acting as fulcra, let us remember that the primary anchorage is in the molar region, and through this agency each one of the anterior teeth may be and usually is moved to its nor-

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* See COSMOS for October 1913, vol. lv, p. 1027.

mal position. Do you not see, as a result of such tooth movement, how uncertain a measurement taken through the agency of these moving anterior teeth must be? Necessarily, in using such a method the operators advocate the moving of but one or two teeth at a time, lest the points of control be disturbed and relationship be lost. In using the archograph, all variations are measured from the anchor attachments—points that either remain fixed throughout the entire treatment or are changed in a positive and definite manner; hence the number of teeth moved by changes in the arch at any one sitting is limited only by the skill of the operator in planning for such movement and the demands of the case. This greatly reduces the frequency of arch removal for re-binding, which in itself is a decidedly important detail. Once a month is as often as has been found necessary to do this by the writer.

It has been proved to me conclusively that it is just as possible to tip the teeth in carrying them labially with the new appliance as with the old. Time and again I have altered the arch, and have found that the base-wire was moved forward the correct distance, while the top of the pin was but little changed. How can we account for this? Easily. In order to have the base-wire and pin travel in parallel lines the bend must be made along a plane parallel to the plane of the buccal tubes. A bend upward means greater crown movement than root; a bend downward means greater root movement than crown. Still another proof of the necessity of judging our arch changes from their relation to the molar anchorage. This variation from the proper plane of bending also accounts for the tendency for certain individual teeth to elongate during treatment.

I cannot too strongly condemn the technique suggested by Dr. Young for the production of root movement. His method is to grasp the arch with two pairs of pliers and rotate it upon itself so that the tops of all the pins will be carried forward. Such a procedure produces a terrific destruction of anchor relationship, and results in perverted force throughout the whole appliance. How much the pins are inclined is but a guess, and what the result will be when readjusted to its anchor sections no one can tell. Let us get away from such radical methods based upon luck and chance, and work along accurate lines. To produce root movement each individual pin should be bent, one at a time, in the most careful and painstaking manner. After bending, a measurement should be taken from the previously fixed index to determine the result. When correct, another pin is altered in the same manner.

These are some of the facts that have impressed themselves upon me as I have studied, in as accurate a manner as I knew how, the new appliance.

Certainly never before have we as specialists in orthodontia been called upon to exercise so much thought, patience, and skill as the techniqne of this appliance now calls for. We stand, as it were, on the verge of a precipice. We can gain a safe, exalted, and supreme position if we but exercise care, use time, and tediously, step by step, pick our way to safety and success; or we can cast aside all caution, hurry along, stumbling blindly on until we rush headlong over the high cliff into the valley of failure. The choice is before us. It must be from now on either scientific orthodontists or careless, money-seeking pseudo-scientists. Let us consider carefully before making the choice.

CONDITIONS IN THE MANDIBLE PRODUCING REFLEXES IN THE FACE.

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AT no time in the past has the profession been so awake to the important relationship of the teeth to reflexes occurring in the face and cranium. For many years such writers as Cryer, Marshall, and others have called attention to the fact that the teeth were responsible for many troubles apparently emanating from other sources, and have reported cases to establish their claims, but it required the advent of the X ray and the resultant accumulation of evidence to establish these claims beyond any question.

"NEURALGIA" AND REFLEXES.

In the past, few words in our nomenclature have been so overworked, and perhaps misapplied, as the old term "neuralgia." Particularly has this been true when no adequate cause could be found to explain the occurrence in the face and cranium of the characteristic pains which the term neuralgia implies.

With our better understanding of the internal anatomy of the face, and with the splendid advances made in dental surgery, in the fields of the eye, ear, nose, and throat, and in improved X-ray technique, has come the discovery of many local exciting causes of these pains, which has lessened the multitude of sins to be covered by the term neuralgia, and has classified many such phenomena as reflexes.

ANATOMIC PECULIARITIES OF THE MANDIBLE.

In entering upon a discussion of the importance of the mandible and its component parts as one of the important sources of these reflexes, it should not be inferred that the maxilla is not deemed equally important by the writer, but simply that this one part of the face offers sufficient scope for a special treatise.

Furthermore, there are other reasons why this important organ warrants separate discussion. In the first place, it is unique as compared with other bones of the skull, in that it is independent so far as osseous attachment goes, and because of its independence and exposed position it is the heaviest and strongest bone of the skull.

Even under ordinary circumstances it it subject to continuous change in form, not only in regard to its general contour, but also in accommodating itself to the movements and growth of the teeth, the former taking place at or near the angle, while the latter occurs in the alveolar portion of the bone.

The element of variation also enters into the consideration of this part to a degree not exceeded by any other bone of the skull. Anyone who spends much time in the study of anatomy cannot fail to note the great number of variations occurring. In fact, they are so common that it is often difficult to say with exactness which are typical anatomy and which are anatomical variations. It is not meant by this that anatomical structures are not sufficiently constant, so that general rules cannot be laid down, but simply that the more closely the subject is studied, the more variations as to details are recorded.

These *variations* are not limited to

external form and size, for there are as many deviations in the internal anatomy as there are in the general appearances, and in the mandible these are of vital importance to us. Variations, however, should not be confounded with deformities; the former may be perfectly normal, while the latter are abnormal.

ANATOMIC VARIATIONS OF IMPORTANCE IN THE MANDIBLE.

Of great importance to us is the position and form of two structures of the bone under consideration—viz, the inferior dental canal and the angle of the jaw, and the relation which they bear to the roots of the teeth. Speaking generally, the inferior dental canal, or cribriform tube as it is sometimes called, enters the body of the mandible on its internal surface just above the angle, and travels downward and forward horizontally, until it reaches the mental foramen. This canal lies below the alveolar sockets, and from it are given off smaller canals which open into the tooth sockets through minute foramina.

If the inferior dental canal always took the same direction and occupied the same proportionate relationship to the angle of the jaw, and to the superior and inferior borders of the bone, it would not so frequently have a pathological significance to us; dissections and radiographs, however, plainly show great deviations from the normal.

The canal approaches the superior or alveolar border of the bone more closely in the region of the angle than at any point, and this tendency is more exaggerated in some racial types than in others. Its horizontal position also varies from lying just below, or almost in contact with, the apices of the roots, to being well below them and down toward the inferior border of the bone.

The function of this canal, as is well known, is to convey the inferior dental artery and vein as well as the inferior dental nerve, which is the largest branch of the third division of the fifth cranial nerve. It might be well to emphasize the fact that this last-named nerve differs from the other branches of the fifth in that it is both sensory and motor in function, and, besides supplying the lower teeth, also sends off filaments to the lower parts of the face, the muscles of mastication, the tongue, etc. Therefore, any disturbance occurring along its course can produce an unusually marked effect upon the individual by way of reflexes.

The mandible is by necessity, as we have seen, an extremely dense bone, the outer and inner plates (the U-shaped portion) being cortical in structure. The cancellated bone, therefore, in which the roots of the teeth and canal are embedded, is by necessity very limited in area. It should be plain to all that, if any changes occur in the character of the bone, or in the size or position or character of the teeth, the normal functioning and activity of the structures of the canal are endangered.

Among the factors of importance to us in this connection, two deserve special mention: (1) Changes in the internal structure of the bone due to inflammation. (2) The mechanical interference resulting from anomalous or impacted teeth.

There are two opposite processes, either of which can be associated with inflammation within the mandible. One is a destructive or suppurative process, causing a breaking-down of the cancellated bony structure; the other a constructive or hardening process, through which the cancellated structure may be transformed into hard and dense bone.

Destructive or suppurative changes in the mandible. The first-named process is by far the most common of the two, and is usually brought about by an abscess emanating from one of the roots of the teeth. If unchecked, the injury from such lesions depends upon the extent of the destructive process and upon the relative positions of the lesion and the inferior dental canal. In some jaws the destructive process need be but slight to expose the nerve trunk to its irritating influence, while in others a considerable area might be involved before the structures in the canal are directly affected.

In connection with destructive inflammatory conditions, the statement previously made in connection with the anatomical structure of the bone under consideration should be emphasized, viz, that the cancellated or internal portion in which the teeth and canal are embedded is very limited in area, and is held within the outer layer, which is perhaps the densest in character of any bone of the skull. So, in extensive inflammatory processes, the ravages of disease naturally follow the way of least resistance (the cancellated bone), and may travel through these comparatively open structures from one end of the bone to the other—hemmed in, as it were, by the very dense outer structure—eventually finding an outlet at the mental foramen or through the alveolar border of the bone.

Constructive or hardening changes in the mandible. The other process named as being associated with inflammation within the bone, viz, the constructive or hardening process, may completely change the character of both the cancellated and cortical portions in a given area, through stimulating the bone-building cells of these tissues to undue activity. Such changes are induced through orders of inflammation lower than those accompanying the destructive or suppurative process, and are also brought about through constitutional disturbances. As a result, the cancellated tissue may be filled up or converted into a substance so nearly resembling the cortical bone that the line of demarcation is obliterated.

IMPACTED TEETH.

There is no doubt that this process is responsible for non-eruption or impaction in many instances, for when secondary deposits occur within the cancellated bone, the tooth-sac may be entirely covered or sufficiently interfered with so that the eruptive forces are insufficient to carry it to place in the arch. Teeth thus affected must remain in their place of development or be pushed in the direction of least resistance, which oftentimes carries them far from their intended positions. In fact, teeth prevented from passing in their normal course may, through the resorption of the bone, advance in almost any direction, and be erupted through the bone even on its cervical aspect.

As a result of inflammatory processes in childhood, due either to diseased teeth or to constitutional disorders, scarlet fever, etc., the capsule of the tooth germ may become adherent to the walls of the jaw, and instead of being carried downward and forward in the cancellated tissue with the growth of the bone, remain well up in, or above, the angle.

There is no doubt in the essayist's opinion that a large number of impactions of the third molar which give trouble after maturity have their inception in childhood between the ages of five and twelve, and result from the last-named inflammatory process induced through some of the so-called children's diseases, such as scarlet fever, or other constitutional disturbances which cause inflammatory conditions in or about the jaws.

ANOMALOUS TEETH.

So-called "anomalous" teeth, while rare as compared to ordinary impactions, may properly come in for consideration in a discussion of this kind.

Broadly speaking, anomalous teeth are those which are abnormal in size or form and are of importance to us pathologically when their eruption is fully or partially prevented. In fact, anomalies are sometimes produced when the process of eruption is retarded or prevented, this being particularly true if some positive force stops the progress of the organ. Under such conditions, its completion in development is necessitated in an area or position in which natural shaping and growth is unfavorable or impossible. Such a statement, however, should not be construed as implying that all teeth prevented from eruption become anomalous, for clinical observation as well as radiographic confirmation would prove such an idea erroneous.

Fused teeth. Neither should it be inferred that anomalous teeth result from

this cause alone, for we know that they exist in many forms and probably emanate from many causes unknown to us. Sometimes two or more teeth become united or fused during the process of their development, and again a similar fusion or concrescence can take place after development is complete.

Geminous teeth. Another anomalous condition of importance known as a geminous tooth is the result of two separate tooth germs being confined within a single sacculus. These teeth may be similar or dissimilar in size and form, and may be united or entirely separate.

Anomalous roots. It is also possible for all that is visible of a tooth, viz, its crown, to be perfectly normal in form and size, and yet for its root to vary toward either of the extremes. Very large roots cannot always be counted as anomalies, for the enlargement of a root is oftentimes the result of a pathologic process known as hypercementosis, in which secondary deposits of cementum can occur in sufficient quantities not only to very materially increase the size of the root, but to change its form as well.

When any of the before-mentioned conditions, as well as ordinary impactions, occur in the mandible, the delicate structures of the cribriform tube are endangered, the amount of injury which will accrue depending upon the degree of interference or irritation to which these structures are subjected, and to the amount of constructive ability which the part is capable of mustering.

Nature undoubtedly often overcomes these conditions or accommodates herself to them by new activities, but there are limitations to what nature can do even under the most favorable circumstances.

DIAGNOSIS.

So, when any one of the before-described conditions is known to exist in a given case, and the individual is subject to pains occurring in paroxysms and distributed along the course of the nerve trunks, it may be regarded almost with certainty as being the exciting cause. Moreover, if these pains occur in patients in whom the exact condition of the internal structures of the mandible is not known, radiographic examinations should be resorted to.

It is not the object of this paper to discuss exciting causes other than those which are induced through the existence of the conditions before enumerated, nor has an attempt been made to cover the entire field of pathological conditions which can result from these causes.

The question of diagnosis has been but briefly mentioned, for diagnosis and treatment rightly belong to the sphere of the dental and oral surgeon.

In conclusion, the writer ventures the opinion that a more extended adoption of the X ray as a diagnostic aid will result in the clearing-up of many obscure conditions having their origin not only in the mandible, but in the maxilla as well, and will prove a boon to many whose sufferings might otherwise remain unrelieved.

Proceedings of Societies.

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Regular Monthly Meeting, held May 26, 1914.

The regular monthly meeting of the Academy of Stomatology was called to order by the president, Dr. J. V. Mershon, in the College of Physicians, on Tuesday, May 26, at 8 P.M.

The President introduced as the essayist of the evening, Dr. Clarence J. Grieves, Baltimore, Md., who read a paper entitled "The Relation of the Internal Secretory Organs to Malocclusion, Facial Deformity, and Dental Disease."

[This paper was printed in full at page 954 of the August issue of the Cosmos.]

Discussion.

Dr. Jos. Sailer. Dr. Grieves has left very little to discuss. I have rarely heard a paper of this brevity which covered its field more thoroughly. The essayist's subject is a large one, as anyone who cares to look at the number of references in the second volume of Biedl's second edition can easily satisfy himself. I have forgotten the number, but it runs to about 10,000 articles pertaining to the subject of the ductless glands alone; a large part of Vincent's book is also devoted to references to literature on this subject. In the recent book of Noel Paton, a small monograph, some fifteen or twenty pages at the end are given to the more recent literature on this subject. It is impossible for anyone, probably even for Biedl, who devotes himself exclusively to this study, to attempt to cover the literature on this subject. It seems impossible, almost, for a man to restrict himself to one small phase of this subject, as Dr. Hammar restricts himself to the thymus gland alone, which has a particular interest, it would seem, for the dental profession, and to cover it exhaustively in his writings.

The term "ductless glands" is a sort of negative name, and does not satisfy us entirely. We are in a state of uncertainty. I sometimes think that many domains of human knowledge undergo just about the same phases of development. Take, for example, astronomy. In the early days nothing was simpler than the conception that the earth was the center of the universe, and that the stars were placed more or less upon the inner surface of a hollow sphere and revolved around the earth. Copernicus and Galileo caused quite a confusion in the minds of scientists of those days. They found that not only the stars revolved around the earth, but that the earth revolved around the sun, and the theories that were devised at that time to explain the various motions of the stars and the planets were exceedingly complex. Then Newton showed that all the motions of the various bodies in the universe were controlled by certain truths easily understood by easily known physical laws. I do not think the word "understood" is correct. Nobody understands the attraction of gravitation, I believe, but we can know that there is such a force as the attraction of gravitation, and understand how it acts.

Ductless glands are very much in the second stage of development. I can

remember very well what a simple affair the ductless glands were some twenty or thirty years ago. They were usually vestigial rests. They were left over from an earlier phase of existence, and they remained stuck in various parts of the body, where they did no particular harm unless they underwent pathological changes—and of course they did no good at all. That was the physiology taught everywhere, excepting that it was known that the thyroid had something to do with cretinism and myxedema. As to any activity on the part of the pituitary body, it was not dreamed of at all; that was something beyond the philosophy of the physiologists of those days.

Today the subject is so complex that we have at least three excellent text-books on the subject, each dealing with a single phase. Biedl takes up the subject very largely from the experimental side, but discusses somewhat less thoroughly the clinical side. Swale Vincent devotes himself almost exclusively to the developmental history of the gland, and Noel Paton to the effect of the activity of these glands upon metabolism. I have spoken hitherto of each of these glands as if, to a certain extent, they were independent organs. They are far more complex than this. Practically all of them are now known to consist of two parts or structures, which seem in a way to be independent portions. Take, for example, the pituitary body; there is the anterior or glandular portion and the posterior or infundibular portion. As far as we know, the anterior portion secretes the hormones which control growth. The function of the posterior part is not known, but the posterior part contains those substances which, when administered to animals or human beings, produce definite results.

The thyroid contains the thyroid tissue, the excess or lack of which produces Graves' disease or myxedema, and the parathyroids, the lack of which produces tetany and in many animals death.

The suprarenals contain the chromaffine body in the interior, and the cortex, which is probably epithelial in nature, in the external portion. The chromaffine tissue has to do with the control of the sympathetic nervous system. As far as we know, the cortex controls growth and sexual development. This chromaffine tissue is very interesting. It receives its name from the fact that it is stained brown after immersion in salts of chromic acid, such as the old Mueller's fluid. It is found not only in the suprarenal glands, but also in the sympathetic ganglia and in certain curious structures that lie along the anterior surface of the aorta. This combination of two tissues, apparently of separate functions, is also found in the thymus, pancreas, and in the sexual glands.

Why each ductless gland or gland of internal secretion should be dual in this way is one of the problems that presents itself in the course of the study of these structures. Of course, the important part of the study of these glands is to determine the nature of the secretion which we assume is poured forth. As these glands are ductless, and as these secretions are presumably introduced directly into the blood, we have not up to the present time been able to isolate anything excepting possibly the droplets of colloid matter found in the thyroid. Therefore we study their effects, and of these effects but little can be said to be absolutely known. The extract of the posterior or nervous portion of the pituitary contracts the non-striated muscular tissue. The same power, however, is apparently possessed by adrenalin, the crystalline substance extracted from the adrenal gland and is presumably identical with the active substance of its secretion. It is supposed that adrenalin acts chiefly through the sympathetic nerves, but this is not absolutely true, because if any piece of non-striated muscular tissue, a small section of an artery, or a fragment of a rabbit's uterus be placed in Ringer's solution saturated with oxygen, and to this the small amount of one six-millionth part of adrenalin be added, the fragment of muscle will show distinct

contraction. However, even in this case, we find that the rule is not constant, because upon the arteries of the brain adrenalin has little effect, and in the coronary artery it actually causes dilatation instead of contraction.

When we come to consider the pathological relation of any single gland, we find that there still remains much to be determined. Take, for example, the pituitary, because that is the gland which more than any other, I believe, has interested Dr. Grieves, and will probably in the future interest your profession even more than it does at present. Acromegaly is supposed to be due to excessive activity of the pituitary gland, but we assume that excessive activity of the pituitary gland is also a great stimulant to sexual development and activity. As a matter of fact, the reverse is found to be true, so that Dr. Mills of the University has discarded the term hyperpituitarism, and uses instead the term dyspituitarism.

There is only one other point to which I would call attention, viz, that cases of acromegaly, of cretinism, and of Graves' disease look enough alike to belong to the same family, although, as a matter of fact, the affected individuals may belong to very different races. When I had the privilege of speaking before the Orthodontic Society, I called attention to two pictures of pituitary giants I had been able to obtain—one an Austrian, the other an American—who looked almost like brothers. This winter I had a case of Froelich's disease, and when I showed the mother a picture of a case in Biedl's book, she remarked on the extraordinary similarity between the patient pictured there and her own child. Is it not possible that part of the difference in individual appearance is due to the variation in the normal growth of these glands?

Dr. E. C. Kirk. I wish to express to the essayist my sense of personal obligation for what I might call the almost panoramic view that he has given of this very intricate and at the same time very important subject. Various phases of his presentation impressed me very strongly. We have had in dentistry, as in medicine, a lot of ancient superstition, and I think some superstitions are still with us. Almost one of the first things I studied in physiology during my dental course was the importance of feeding pregnant women on a certain amount of calcium salts in order to preserve their teeth from being robbed of such salts by the development of the fetus. Even at that callow period of my professional career, I put a query mark after that idea, and I have never fed prospective mothers with foods very rich in lime salts for that particular purpose. We are in the age of a possible expansion owing to the light that is being thrown upon the importance, in a physiological way, of these hormones which are developed from the ductless glands.

We should look to the study of this particular glandular system for the solution of a number of questions of importance to us dentists, as, for instance, the growth of the teeth, and their relation to the malformation of the maxillary bones—which means that we must go more deeply into the study of physiology and physiologic chemistry than heretofore.

I am impressed also with the magnitude of this subject, to which Dr. Sailer has called attention in referring to the investigations of Biedl, who has devoted himself exclusively to the study of the thyroid gland. The question of the ductless gland system itself is so elaborate that one must devote his entire time, not to say his lifetime, to the elucidation of its meaning. The increase in the mere bulk of data means that we must specialize in this department, and that we cannot comprehend the relationship of the ductless glands to our particular specialty without the concurrence of activity on the part of a number of specialists in close co-operation, together with detail discussion of the subject.

I wish to express again my appreciation to Dr. Grieves and Dr. Sailer for the panoramic presentation of this matter and the orientation of our ideas with reference to the relationship of the duct-

less glands to dentistry and the other specialties which are chiefly concerned with the region of the head and jaws.

Dr. M. H. Cryer. I have listened to Dr. Grieves' paper with great pleasure and profit. He has covered so much ground that it is only possible for me to mention a few points which appeared the most interesting to me.

First Dr. Grieves says—"There is an increasing percentage of malocclusion observed in dentures, particularly in the temporary ones." I think he is correct in saying that they are *observed.* The reason for this is that the number of dentists or orthodontists is increasing very fast, and they all become observers, and are ready to note what they find. To my mind the proportion of malocclusions is no greater than it was three thousand years ago, neither do I believe that the facial bones, the alveolar processes, the number or quality of the teeth have perceptibly changed, except possibly where the offspring of the mixed races of this and other countries is producing new types.

There is a general claim that the jaws and teeth through the "civilized food habit" are deteriorating, the number of teeth are decreasing, and there is a more frequent absence of the third molars, lateral incisors, etc. But just such conditions can be found in ancient skulls, and on the other hand, there are at the present time quite as finely developed and powerful skulls, with teeth in good occlusion, as can be found in any of the ancient skulls.

While we find impacted teeth in modern skulls, we can also show them in ancient skulls.

Comparing with modern cases where the bicuspids have never been developed, an Egyptian skull can be shown with the same defect. On the other hand, there are plenty of modern skulls with supernumerary molars, and living persons with five incisors.

In regard to the improvement in general health of the patient after spreading of the dental arch, I believe that Dr. Grieves is correct in saying that the base of the brain-case cannot be changed anatomically by this procedure. The cranium is one of the strongest bony structures in the body, while the upper dental arch is of the weakest construction. To compare the two would be like comparing a cast-iron boiler with a cracked eggshell.

While it is not possible to change the base of the skull anatomically by widening the dental arch, I feel confident that the physiology of the region of the pituitary body can be changed. The spreading of the arch allows the tongue to take its proper position within the mouth, relieving the pharynx of its abnormal obstruction, and affording drainage and ventilation of the nasal respiratory tract. This, in turn, gives relief to the engorgement of the mucosa and allows free circulation in the complicated anatomical arrangement of blood-vessels in the region of the pituitary body and the surrounding tissues, including the eye, etc. Following the circle around brings us to improvement in the general health of the individual.

Mr. Hunter, New Zealand. The essayist's paper has been most interesting, but I regret very much my inability to criticize it in any way, as it would require considerable previous study for fruitful discussion.

The essayist speaks about the question of foods and our mode of living with regard to the spreading of the arches, and so on. Just before I came away, Dr. Decker had been up with the Maoris, who are partly civilized now, though in the interior civilization has not reached them to any extent, and from all the data he could get there he finds that they live practically on soft foods, cooked in such a way that most of the juices are retained. They use very hot stones, heated by brush and piled over with earth, and in this way they come to chew a little of the stone that is collected with their food, which affects their teeth in the manner which Dr. Decker thought to be due to soft food.

I wish to express my gratitude for the kindness I have met since I arrived in America, and to assure Dr. Kirk of

my appreciation of his friendly interest and attention.

Dr. H. E. Kelsey, Baltimore, Md. I was very glad indeed to accompany my friend Dr. Grieves to this city in order to hear the paper and the discussion. I had read the paper beforehand, but I have not made a thorough enough study of this subject to enable me to discuss it intelligently.

Dr. Sailer has fitly remarked that this subject is so complex that it resembles the second stage of astronomical knowledge, and that we are somewhat in the same position at the present time. It seems to me that we have not as yet discovered the key or the great secret of the activities of these glands, but the interest that is being manifested in their study may at any time reveal to us the knowledge of their real function and of the manner in which they control other structures and the various activities of the body. That is devoutly to be hoped for.

If Dr. Grieves' hypothesis in regard to malocclusion, which seems to be substantiated to some extent by the limited knowledge we have of this subject, can be further proved, it will mean a step in advance, for the orthodontist stands very much in need of a more exact knowledge than we have today on many of the phases of malocclusion with which we have to deal.

Dr. Grieves (closing the discussion). I feel that I have spoken too long already, but there are one or two things I wish to mention in this connection that are very close to my heart. It seemed to me this was the best place to which to bring this paper, because here I could get in touch with men of learning who are interested in this most important subject.

I feel safe in saying, however, that we have not yet begun to study this matter. There are innumerable facts that bear directly on our dental work which I believe we have not as yet touched. This paper contains simply a lot of other men's ideas; just a little suggestion of my own here and there; but my idea was to invite the co-operation of orthodontists, dentists, embryologists, physiologists, and brain surgeons in a further elucidation of this complex subject.

I want particularly to thank those who have discussed my paper, and also to express my appreciation to Dr. Cryer, who gave me a whole afternoon and was good enough to show me many of his slides. I wish also to thank Dr. Warren Davis, who is not present.

The field is broad, and we shall have to get together on it, and seek as best we can to arrive at some solution.

The meeting then adjourned.

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL OF ORTHODONTIA.

Fifth Annual Meeting, New York, April 23-25, 1914.

THE fifth annual meeting of the Eastern Association of Graduates of the Angle School of Orthodontia was called to order on Thursday morning, April 23d, at 10 o'clock, in the Academy of Medicine, New York, by the president, Dr. A. W. Crosby, New London, Conn.

The first order of business was the reading of the President's address, as follows:

President's Address.

By Dr. A. W. CROSBY, New London, Conn.

The Eastern Alumni of the Angle School have held four meetings this year, three occupying an afternoon and evening each, the fourth being the three days' session we are now entering upon. The programs which have made these meetings so interesting and helpful are the result of the Executive and Scientific committees working in unison.

PAST AND PRESENT SCOPE OF WORK.

The Executive Committee has led us on a wide excursion into collateral fields, such as rhythmic breathing as an aid in overcoming mouth-breathing, the ductless glands and their relations to growth and development, bone development and repair, and scientific feeding; and at this meeting we are to learn more about etiology and heredity as factors entering into malocclusion; adenitis, habit, sinus diseases, X-ray measurements of unerupted teeth, etc., the development of orthodontia, and business problems in office management.

At the same time we have not neglected the practical side. Clinics have been given in New York on the new appliances and their actual construction, and patients were exhibited wearing the appliances and showing good results from even a few treatments. In Philadelphia we saw the making and adapting of plain molar bands, the construction of molar clamp bands, showing each step and all the instruments used in making them, also an ingenious appliance for tipping back a second molar in a case in which the first molar had been extracted, permitting the use of intermaxillary force without disturbing the anchorage. In Boston we discussed the action of the new appliances in a large variety of cases exemplified by models taken during treatment, a modification of the new appliances used in bringing a cuspid which erupted between two bicuspids into place around the first bicuspid, also the treatment of a class III case by the use of the new appliances. The clinics of this meeting will speak for themselves. I think we have all found that these clinics, especially, in which the actual work was demonstrated, to be of great educational value.

The letter sent out by the Scientific Committee and the excellent suggestions contained therein have, I fear, been received with too little consideration by most of us outside of the committee. I believe the scope of work suggested by this committee is so large that there should be at least three sub-committees with a member of the Scientific Committee at the head of each. I would suggest that one head a Research Committee, another a Study Club, and the third a Current Literature Committee, and that as far as possible each com-

mittee make a report at every meeting; the Current Literature Committee certainly should do so.

It has been said that to know one branch of science is to possess a private door into the whole realm of nature. Let us enlist all the members in some committee, and make them work.

There are two problems of oddly opposing nature which confront us, and we can hardly underestimate the influence of this unique society in solving them.

NECESSITY OF EARLY DIAGNOSIS, AND POPULAR APPRECIATION OF ORTHODONTIC TREATMENT.

While it is true that the average dentist does not recognize cases of malocclusion in its first stages, yet parents are more and more awakening to the necessity of early diagnosis. Henry Sydnor Harrison must have been thinking of Orthodontia when he said, in "V. V.'s Eyes"—"With one-half the world only, as all know, is character destiny. The rest is bent or twisted, glorified or smashed, by Physiognomy, the great potter." A New Haven parent said recently, "It is a mark of your social position, now, whether or not your children have bands on their teeth." One little patient recently gave a sigh of satisfaction as she remarked, "I like the feeling of gold in my mouth." So far as mothers and children are concerned, orthodontia is getting to be a favorite.

The most progressive dentists recognize malocclusion and inform the parents of the need of orthodontic treatment before the case has progressed to its spectacular stage. But the average practitioner does the parent and the patient a great injustice by allowing hundreds of cases to pass through his hands with no word of warning. Perhaps the old practitioners cannot be taught to change their ways, but this society can extend its influence to the dental colleges and examining boards, so that the new generations of dentists may learn that an ounce of preventive orthodontia is worth a pound of cure.

According to my experience, parents and patients are ready when once they see the need at the proper moment. There are less cultivated parents, it is true, who weigh in the balance a trip to Europe or a new automobile against the fees suggested by the orthodontist. There are savages who prefer a silk hat and a string of beads to an "édition de luxe" of the Encyclopedia Britannica. I think we should welcome and seek invitations before mothers' clubs where the beneficial results of orthodontic treatment, though they ought to need no brief, may be pleaded.

LIMITED NUMBER OF TRAINED SPECIALISTS IN ORTHODONTIA.

The harvest truly is plentiful, but the Angle laborers are few. From 1900 to 1906, a class graduated from the Angle school each year. In the last five years there have been only two classes, and there is no definite promise for the future. The demand is increasing, and the supply diminishing. What is the result? Unskilled men are doing orthodontia. The more difficult cases are sent to the Angle school graduate, and the less difficult ones are done by the dentist who is "beginning to specialize in orthodontia." He does half the work and gets half the fee, a mathematical formula which means that he is being paid as well as we are.

We have nothing to fear or to complain of, if we maintain our high standards. How can the high standards be maintained other than through such a society as this?

AIMS.

Let us therefore next year take up our share of the work which the Scientific Committee has prepared for us, that another year may find us on a higher plane than we have ever reached before.

One of the favorite drives on the island of Jamaica is that up the mountains several thousand feet to the British military camp at Newcastle. Everyone is warned when setting out upon this

drive not to take any photographs until he is half way up. It is a great temptation to take views at the first rise. It seems as if nothing could be finer on the greater heights. But after one has traveled half way up the mountain slopes he sees the reason for the injunction. The squares of the city of Kingston lie like a checkerboard at your feet. Tall bamboo trees which you passed on the way up now look like feathery ferns in the valley. You look down from the mountain heights on the ocean, which toward the south the fierce rays of a tropical sun transmute into the golden Carribean. Tall peaks beckon you on to greater heights. But ever after, the slogan will ring in your ears, "Don't take a view till you are half way up!"

Some of us have traveled many miles this year to follow the meetings of this society. We have spent some quiet hours in work and study in our profession. But we have a more extended view than the man who has remained on the foothills. It is a toilsome climb, but let us remember—

The heights by great men reached and kept
  Were not attained by sudden flight;
But they, while their companions slept,
  Were toiling upward in the night.

The next order of business was the reading of a paper by Dr. MILO HELLMAN, New York, N. Y., entitled, "A Study of Some Etiological Factors of Malocclusion."

[This paper is printed in full at page 1017 of the present issue of the COSMOS.]

Discussion.

Dr. H. A. BAKER, Boston. I was very much interested in Dr. Hellman's paper, which corroborates some statements which I have heard before. In regard to breast babies and bottle babies, I have had some little experience. My own son, who was a bottle-fed baby, developed a class III case of malocclusion, which brought about the use of intermaxillary elastics. When my youngest son was a baby, his mother was taken very ill and we had to bring him up on the bottle. In his case we used a bottle with a long rubber tube connecting the nipple with the bottle. After getting his nourishment he would continue to hold the nipple in his mouth—in fact, it was in his mouth most of the time. Of course I did not think that this would have any particular effect on the mouth—I was a rather young man, and not much was known at that time about orthodontia. Sometime afterward I found a space between the child's lower and upper front teeth in which I could place my thumb. I subsequently forbade the use of the nipple.

A MEMBER. How old was the child at that time?

Dr. BAKER. He was an infant in the crib, but he already exhibited a very pronounced case of malocclusion. I studied the case quite a good deal and set about to bring the upper teeth back and the lower teeth forward, as I was unwilling to sacrifice any teeth. I took a model of the case and made an appliance that would produce the proposed movement of the arches, and I finally succeeded in producing a fairly good occlusion. It was in this connection that the intermaxillary elastics were originated. I used elastics about four times as heavy as I use now, and of course the baby suffered a great deal, but there was force enough to bring the lower jaw forward. Dr. Hellman showed quite a number of nipples, and I noted especially those with the rubber tubing. It is not so much in securing nourishment through the tubes that the harm lies, as it is in the nipple remaining in the mouth and causing a constant though gentle pressure. At the meeting of the American Society of Orthodontists in Detroit, I read a paper on "Habit in Class III Cases," and I advanced the theory that most class III cases are due to habit. About that time a very pronounced class III case presented, and the parents could not afford to pay a commensurate fee. The mother one day told me that the child's mouth had not always been that way. I thought she

was mistaken, but she insisted. I asked her if she had a picture of the boy taken when he was very young. She sent me the picture, and in it no deformity was noticeable; when this picture [showing one of Dr. Hellman's pictures] was thrown on the screen I was reminded of that case. Is there any tendency to a class III case here? It seems to me that there is no trace of any deformity pertaining to class III cases.

Dr. Hellman. The next slide shows a class III case.

Dr. Baker. At what ages were these pictures taken?

Dr. Hellman. At fourteen, sixteen, and eighteen.

Dr. Baker. Were any of these models taken at this period?

Dr. Hellman. Yes, three.

Dr. Baker. You see there has been little extraction and little mutilation. The theory I advanced in this connection was that the irregularity was not due to extraction or mutilation, but to the fact that the patient could not masticate properly, and in an effort to find a better occlusion of the teeth for mastication, the jaw was thrown forward. All my observations since the mother brought that baby to me stating that his face had been normal when he was young have corroborated my theory that this irregularity is the result of habit.

Dr. H. C. Ferris, New York. I would like to discuss Dr. Hellman's paper as a whole rather than this one particular point. I believe that Dr. Hellman has set a pace that we can well follow. He has started a fundamental work which is undoubtedly going to be of inestimable value to us all. We cannot all follow in the same groove, possibly, but those of us who are particularly interested in this field should make an effort to assist in this line of procedure.

The statements that the essayist makes tentatively with reference to bottle-fed children I believe to be worthy of consideration, but there is a great amount of data adverse to the essayist's deductions. I have heard it refuted that bottle-fed babies show such a bad history as was presented by Dr. Hellman; but suffice it to say that if such a finding has been made by one investigator, it is sufficiently important for us to start investigating from our own standpoint.

The question of diet during pregnancy has been very little considered by the medical profession, and the data obtainable are meager. A great deal has been written on the subject, but it is not of sufficient value to be thoroughly accepted by dietists at the present time. We can go into that field as well as into any other specialty of medicine. I feel grateful to Dr. Hellman for bringing this matter before us in such a thorough manner, and I believe that the ultimate result will be of great benefit to us.

In reviewing this slide [showing one of Dr. Hellman's slides] I feel that it may not be a class III case at all. These irregularities are progressive as soon as the mutilation takes place, and the face of the boy in the top picture looks to be absolutely normal. At that particular time the premolars in the upper jaw had been removed, and the patient slipped his bite: as the result the irregularity would have been progressive. I doubt, unless data can be furnished to prove it, that the man had acromegaly at all, but believe that his jaw simply developed abnormally owing to perverted function, and I have any number of cases to prove that assertion. This patient may have died from a disorder of the alimentary canal. The function of his oral cavity was more or less destroyed, and the power to stimulate the salivary flow was almost lost. The occlusion was reduced probably to only thirty-two inclined planes, which, from a mechanical standpoint alone, would support my argument. I think it would be very interesting if Dr. Hellman would review the report of this case from the standpoint I have suggested. We can find any number of cases which, as soon as they are mutilated in that manner, become progressive.

Dr. F. L. Stanton, New York. I think that Dr. Hellman is to be con-

gratulated, and personally I want to thank him for the tremendous amount of work he has done on his paper. Each of us, of course, interprets the paper according to his own judgment, but to me it seems to be a protest against the accepted doctrine of the etiology of malocclusions. It is a protest against the theories we have been taught that malocclusions are not inherited; a protest against the theory that deformities cannot be transmitted, else we should soon become a race of freaks; a protest against all arguments of etiology as taught us in our study of malocclusions. In my opinion, when children present to us, we should, rather than look for the mechanical local causes present, think of each child as an individual. In the history of every child's parents, certain cells characteristic of the parents were set aside. The number of chromosomes in the human species is perhaps twenty-four, and the parents of this child are setting aside cells in the ovum and the spermatozoon which contain one-half the number of chromosomes at the time of fertilization —thus, eleven coming from the father and eleven from the mother—and thus influencing the child in an hereditary way. Dr. Hellman pointed out that the beginning of malnutrition is brought about at that time, and we must therefore look more deeply into these underlying causes rather than hold to the accepted theories.

Mr. W. F. Blades, New York. From Dr. Hellman's paper and its discussion it seems apparent that the members of this profession are beginning to see that, besides the mere results of mechanical influence or arrest of development, and factors of that kind, there is some ulterior factor perhaps directing these mechanical and nutritional influences. Dr. Hellman very aptly spoke of birth as being merely an incident in the development of the individual, and of the fertilization of the egg cell by the sperm cell also as being merely a point in the development of the ovum. I have never heard that put in quite such concise language.

Dr. Mills. I have four children in my family, namely, three boys and a girl; the three boys were bottle-fed from the beginning, and not one has any sign of malocclusion. Ten years elapsed between the birth of the youngest boy and that of the girl; she was breast-fed from the beginning, and presents quite a decided case of malocclusion of class I. This does not, so far as my family is concerned, seem to correspond with the theories advanced in the essayist's paper. I appreciate that we have an immense amount of work to do, and that the essayist has given us something to think about.

Dr. Hellman (closing the discussion). I think I have said all I had to say in my paper. There is one point, however, which I think would bear repetition, which is that I had not the slightest inclination to advance any theories. I merely presented my findings, and am willing to be corrected if the contrary thereto can be proved. It was my intention to point out a way for the study of the problems involved in the etiology of malocclusion, *i.e.* by individual factors. Thus, by taking one factor under consideration and tracing it as far as possible, we shall determine first whether or not it *is* a factor. Then, by combining the different factors, we may ascertain the effects produced by them on certain forms of malocclusion. This involves a great deal more work than has been accomplished until now, but it will be a pleasure to do it, if I can engage the co-operation of all those interested in this problem.

What I wished to call attention to in connection with the class III case mentioned is that the diagnostic features so familiar to us are, in this case, representative of disturbance far more profound than is designated by the term employed by us.

Dr. Ferris. Was that case reported as class III in youth? There is nothing there to prove that it was a class III case in youth.

Dr. Hellman. I do not know.

Dr. Ferris. You would be willing to admit that such a case might develop

with such a mutilation without being acromegalic?

Dr. Hellman. I am not offering any probabilities; I am quoting what I gathered from the article referred to.

Dr. Ferris. Did this not occur twenty years ago? and was it not a medical man who diagnosed the case?

Dr. Hellman. This case has been reported by a dentist in the *Oesterreichisch-Ungarische Vierteljahrsschrift für Zahnheilkunde* of July 1913. The patient was operated upon for the tumor in 1910, and died soon after, at the age of thirty-one.

Dr. Ferris. What I wish to maintain is that the general conception of malocclusion by medical men today is entirely wrong. I believe that such a case could develop such an anomaly in the way of malocclusion without any constitutional disorder whatever. The constitutional condition could readily follow from disturbed metabolism due to the mutilated condition of the denture.

Dr. Hellman. It may be true as you say. It needs, however, to be proved whether the extraction of teeth may be followed by the development of a tumor of the brain. We know, according to the present methods of diagnosis that acromegaly is due to an increase in the size of the hypophysis cerebri, as the result of a tumor in that region, as was the case in this instance.

As to the contrary of my findings in reference to bottle-feeding having been proved, I would be very thankful if Dr. Ferris would point out to me the source of his information, for I have failed to find any literature bearing on this subject in relation to malocclusion of the teeth.

In conclusion permit me to emphasize again what I have already mentioned, namely, that I do not consider this work conclusive. I intend to continue the investigation and report from year to year, until the mass of evidence shall have increased to such an extent as to either prove the converse or outweigh all possible sources of doubt.

The next item on the program was a paper by Dr. F. L. Stanton, New York, N. Y., and Mr. W. W. Blatchford, New York, N. Y., entitled "A Consideration of Some of the Problems of Office Management," which was discussed by Drs. Moorehouse, H. A. Baker, J. L. Young, W. H. Casto, and J. V. Mershon.

The next order of business was the reading of a paper by Dr. Sinclair Tousey, New York, entitled "X-ray Measurement of the Unerupted Permanent Teeth at the Ages of Five or Six Years, to Provide for Preliminary Regulation of the Dental Arch, If Required." [The substance of this paper was published in the Dental Cosmos for June 1913, page 619.]

The meeting then adjourned until the morning session.

(To be continued.)

FIRST PAN-AMERICAN DENTAL CONGRESS.

Held in Rio de Janeiro, in October 1913.

To a group of Brazilian dentists belongs the distinction of conceiving and organizing the First Pan-American Dental Congress, the sessions of which took place in Rio de Janeiro in October 1913. A large number of delegates from various cities of Brazil and from several of the other countries comprised in the Pan-American Union contributed by their presence and active co-operation in making the congress as complete a success as its most sanguine promoters could have expected.

The value of such a reunion consists not merely in affording an opportunity for the discussion of the scientific problems included in its program, but also in the incalculable benefit derived from bringing the various members into close touch with one another and enabling the visitors from different countries to gage the progress being made by their neighbors.

This first congress was notable not only for the importance of the technical work discussed, but also for the hospitality offered to the delegates from foreign countries. In few cities of the world is there such opportunity for favorably impressing a visitor, and those who had the privilege of attending this congress enjoyed to the utmost the bounteous entertainment provided by the organizing committee.

The sessions were held in the spacious National Library building in Rio, part of which was placed at the disposal of the congress through the courtesy of the government officials. Dr. Lauro Müller, the minister of foreign affairs, presided at the opening meeting, and thereafter sent his representative on the occasion of each subsequent reunion.

Following the opening address by Dr. Müller, at the inaugural session, speeches were made by Prof. Sylvestre Moreira of Ecuador, Prof. Frederico Eyer of Peru, Dr. José Guerra of the faculty of medicine of Montevideo, Uruguay, Drs. Gustavo Pires de Andrade and Hugo de Andrade of São Paulo, and Dr. Sebastão Jordão, the last expressing the appreciation of the congress of the exhibit of dental appliances which had been installed in the library, and a large part of which had been sent down to Rio de Janeiro from the United States in the care of special demonstrators.

Of the scientific papers read during the congress, many were of exceptional merit, among others being those contributed by Dr. Hugo de Andrade, Dr. Jorge Cajiao Candiá of Bogotá, Colombia, and by Dr. Pierre Rosenthal.

The laboratory of the dental school was placed at the disposal of Dr. Rosenthal for the further elucidation of his paper, and in order to permit him to make a practical demonstration of an appliance for producing the ultra-violet rays from an electric current.

Other important scientific papers were read by Dr. Pires de Andrade, Dr. Coelho e Souza, Dr. Aristides Espindola and Dr. Benjamin Gonzaga, while one of the most important contributions was from the pen of Dr. Alberto Patiño, of Bogotá, advocating the establishment of a uniform and more rational course of studies in dental colleges throughout the countries of Pan-America.

A proposal by Dr. Antonio Sierra of Uruguay, for the formation of a Pan-American dental confederation was transmitted to the congress by Dr. José Guerra and was accepted, the Brazilian Odontological Institute being selected as the headquarters of the federation.

Among the several practical demonstrations which took place at the dental school, those of three of the best known dentists of Brazil, who were originally from the United States, Drs. Chas. and Wm. Hentz and A. R. Shaw, showing a special method of casting gold inlays, attracted special attention.

Several important resolutions were passed by the congress covering substantially the following subjects: The necessity of complete autonomy of the medical and dental professions, respectively, together with an independent course of instruction; the interchange of ideas between the dental schools of the various countries of North and South America, and urging upon the governments of those countries the establishment of an obligatory dental inspection service in schools, both public and private, and an acquaintance on the part of school teachers with the principles of oral hygiene; a more complete regulation of the profession of dentistry, with the view of excluding from practice those who are incompetent; a recommendation that scholarships should be founded in the various dental schools to afford facilities of travel to such students as may deserve a further opportunity to pursue their studies, etc.

The glorious scenery of Rio de Janeiro offered an irresistible attraction to the visitors, and numerous excursions were organized by a committee of the congress for the benefit of a large number of the assembled dentists and their ladies. One day was spent in Petropolis, the beautiful little summer capital in the mountains about two hours by rail from Rio. Another day was taken up by an automobile excursion around the mountains surrounding the bay. The cars traversed the splendid road up Tijuca, 3175 feet high, and returned by the Gavea route to the Botanical Gardens, which lie at the base of Rio's most remarkable mountain, the precipitous Corcovado, 2300 feet in height. Refreshments were served in the gardens, the proceedings being enlivened with a number of musical selections rendered by a military band.

After the closing session of the congress on October 18th, an excursion by boat around the beautiful bay was arranged for the following day, Sunday, which was participated in by a large number of the delegates. Upon their return to their respective homes, the visitors, without exception, carried with them most pleasing recollections of their stay in Rio, of the beauty of the city and the generous hospitality of the people—with, incidentally, the satisfaction of having contributed something to the success of the first of what it is hoped may become a long series of similar conferences.

[The foregoing report, by Dr. Reginald Gorham of Philadelphia, is extracted from the *Bulletin of the Pan-American Union*, where it is accompanied by several photo-engravings, comprising the assembled delegates, scenery of Rio, etc.]

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PHILADELPHIA, SEPTEMBER 1914.

EDITORIAL DEPARTMENT.

THE BUCCAL PROTOZOA.

Two important communications upon the protozoa of the buccal cavity have recently been made, both of which place the vexed question of the etiology of so-called pyorrhea alveolaris in a new and interesting light;—the first by Prof. Allen J. Smith and Dr. M. T. Barrett, read before the recent meeting of the Pennsylvania State Dental Society in Philadelphia, Pa. (June 30th to July 2d), and published in full in our August issue, at page 948, and the second by Prof. Angelo Chiavaro of Rome, Italy, read before the Paris meeting of the American Dental Society of Europe on July 30th, an abstract of which paper is given at page 1089 of the present issue of the COSMOS.

The paper by Professor Chiavaro is essentially a biological study of the two principal varieties of protozoa thus far identified as inhabitants of the oral cavity, viz, *Endamœba buccalis* and *Flagellata hominis.* It is, however, significant that of the sixty-

eight specimens examined from the same number of individual cases, twenty-two were pyorrhetic, and in all these latter without exception endamœbæ were found abundantly, the protozoon being also found in fourteen other cases in small number, leaving a total of thirty-two out of sixty-eight cases examined in which the organism was absent.

It is also worthy of note that the endamœba was not found in carious cavities where the carious process was in active progress, due doubtless to the observed fact that the endamœba dies in an acid medium. The practically constant presence of these protozoal organisms in the pus exudate in pyorrheal cases observed also by Prof. Allen J. Smith and Dr. M. T. Barrett led the former to suggest a test of emetin hydrochlorid as a topical application in pyorrheal treatment, upon the assumption that the well-established toxicity of ipecacuanha to the amœba coli, as amply demonstrated by its successful use in the treatment of amœbic dysentery, might be of value in destroying the vitality of the morbific agent in pyorrhea, assuming further that the protozoa under consideration were the exciters of the inflammatory process in pyorrhea alveolaris.

The practical test of the treatment by emetin hydrochlorid as reported by Drs. Smith and Barrett has given results that are encouraging, not to say astonishing. And since the announcement of these results further tests made by several careful and conservative observers in Germany, France, and England have thus far fully corroborated the findings of Drs. Smith and Barrett.

The method of procedure adopted in the clinical tests made in Europe is to cleanse all pus pockets by pressure and irrigation with physiological salt solution or distilled water, so as to eliminate as fully as possible all pus exudate, and then to instil, by means of a blunt-pointed hypodermic syringe, or other suitable applicator, a few drops of a one per cent. solution of emetin hydrochlorid into the pockets, anointing their margins with petrolatum or vaseline, with a view to retaining the solution in contact with the pocket walls as long as possible. The treatment is to be repeated every other day until all pus flow and inflammation subsides, when thorough instrumentation for the removal of deposits upon the root surfaces may be instituted.

If the one per cent. solution of emetin is found to be locally

irritating it may be largely diluted, as the drug is known to be fatally toxic to amœbæ in a dilution of 1 : 10,000, and after some minutes' exposure they will die in a solution as dilute as 1 : 100,000. The drug is not toxic to man and does not produce nausea when injected hypodermically in doses of one-third grain (0.02 gm.), and as much as one-half grain has been injected without producing unpleasant effects. When taken into the stomach it provokes active emesis.

In the present stage of the investigation it is hazardous to draw general conclusions as to the relations, if any, which the endamœba buccalis or the flagellata hominis may bear to the etiology of pyorrhea alveolaris, or if, indeed, these protozoa are possessed of pathogenic properties at all. That important question will require much further careful study before it can be determined positively or negatively. The destructive effect which emetin exerts upon the buccal protozoa is clearly demonstrated, yet it is known that the drug is destructive of the vitality of certain bacterial organisms, and is therefore not specific in its toxic action upon protozoa. But the study of the subject thus far has brought out the important practical fact that emetin appears to have in pyorrhea treatment a therapeutic action of far greater efficiency than any other medicament known to dental materia medica, and the further scientific study of its action must undoubtedly reveal in time some of the fundamental causes of this puzzling group of disorders so destructive to the integrity of the masticating mechanism and to the general bodily health.

A Correction.

In the discussion by Dr. W. J. Gies of Dr. Bunting's paper on "Potassium Sulfocyanate in the Saliva" (see Cosmos for July, p. 857) a typographical error occurs, as here indicated, in the sentence—"All our tests were suitably 'controlled,' of course, and very slight though insignificant [*read* significant] differences in color were easily observed as a consequence."—Ed. Cosmos.

Bibliographical.

Anesthetics: Their Uses and Administration. By Dudley Wilmot Buxton, M.D., B.S., M.R.C.P.; sometime President of the Society of Anesthetists; Member of University College; Administrator of Anesthetics and Lecturer in University College Hospital, etc. Fifth Edition. With 84 text illustrations and 8 plates; 477 pages. Price $3.00 net. Philadelphia: P. Blakiston's Son & Co., 1914.

When an authority of Dr. Buxton's reputation combines the fruits of his large experience with the evident desire to do justice to all methods and originators of methods regardless of his own personal predilection, the result cannot but be good. This spirit of fairness is most signally displayed in the comprehensive historical chapter, in which are collated many curious historical data, some of which set into sharp relief the tragedies of discoveries unappreciated and genius unrecognized.

With commendable conservatism, "It is urged upon those who hope to acquire proficiency in the use of anesthetics that unless they realize to the full the responsibility which must be assumed by the anesthetist, they will never attain to even the foundation of their art. The timid and the reckless are equally dangerous, the one because he has no faith in his knowledge, the other because he has never realized that his skill and knowledge alone stand between his patient and peril, possibly death."

Without a correct knowledge of the physiological action of anesthetics, the writer points out, the anesthetist is a dangerous mechanical manipulator; for how, without such knowledge, can he employ the modifications necessary in pathological conditions? Individual discrimination, instead of a mere rule-of-thumb system, is paramount for the acquisition of mastery of the most intricate subjects of analgesia and anesthesia. A timely warning is sounded against books which, however well intentioned, mislead students of anesthesia by suggesting simple methods and decrying scientific ones, "ignoring that the former are often instinct with danger, except in the hands of experts, and that the latter are only difficult to those who have not mastered the essential technique." To those who would acquire the wider knowledge, the truly scientific art, rather than haphazard methods, the chapter on Preparations for Operation—Selection of the Anesthetic and Method, gives ample food for reflection; dentists especially may be impressed by the plea that all instruments, rubber bags, and face-pieces should be carefully and thoroughly cleansed before and immediately after use. For dental practice, nitrous oxid, alone or in combination with oxygen, is pointed out as the safest and probably the best anesthetic. Over seventy-five pages and numerous illustrations are devoted to this anesthetic, which is ample proof of the thoroughness which animates the writer's effort. As dentists we should be greatly interested in Buxton's opinion regarding

nitrous oxid and oxygen analgesia in minor dental operations, which is so much in vogue in this country.

Opinions may differ in regard to certain details in the so-called mixed anesthesias which are still in a state of experimentation. More space will have to be devoted in a future edition to Crile's anoci-association, and a fuller account of the modern agents and methods of local anesthesia in dental operations would earn the dentist's approval. In regard to the danger of cocain, Buxton says: "In dental surgery a number of fatal cases have been reported due to the incautious injection of cocain into the gums by unqualified persons who appeared entirely ignorant of the dangerous character of the drug they were injecting." And again: "Cocain is not satisfactory for tooth extractions; small doses are inadequate and larger ones too frequently give rise to constitutional derangement which is often alarming." Quinin and urea hydrochlorid is cautioned against, because "it possesses the objectional property of producing a hard, edematous condition in the tissues infiltrated with it, which persists for a considerable time after injection, even for days or weeks."

No mention is made of synthetic suprarenin as an admixture to novocain, which is infinitely superior to the organic adrenin. A discussion of novocain in combination with hydrogen dioxid, peptone, and potassium sulfuricum, which mixtures have within quite recent years been advocated, would be welcome. While the importance of the isotonicity of hypodermic solutions is duly stressed, no mention is made of the eminent advantages of the Ringer solution.

While elsewhere in his book he recommends the level continuance of anesthesia, Buxton recommends, in intranasal operations by nitrous oxid and ether, allowing the patient to regain consciousness before making a second application of ether when necessary, which seems inconsistent.

While the book is singularly free from misprints in the English text, errors in the spelling of foreign words like Lakalanaesthesia (p. 423), Zeitschaft (p. 424). Friedburg instead of Freiburg (p. 373) have been overlooked.

Extremely valuable features of this book are the chapters on the Accidents and After-effects on Anesthesia, and Their Treatment, and the Medico-Legal Aspects of the Administration of Anesthetics.

Altogether, the dentist who does his own anesthetic work, in our judgment, can obtain no better book for guidance to light and knowledge on this important subject.

Lehrbuch und Atlas der Zahnaerztlich-stomatologischen Chirurgie. [Text-book of Oral Surgery.] By Paul Preiswerk-Maggi, M.D., Lecturer at the University of Bâle. (Vol. XXXIX of Lehmann's Medizinische Handatlanten.) With 35 colored plates and 230 halftones; 235 pages. Price, *Mk.*12.00. Munich: J. F. Lehmann, 1914.

This most attractive and practical book is written by a practical oral surgeon for practicing dentists, and comprises concise and lucid descriptions of those oral surgical operations which can safely be performed in a well-equipped private dental office, granted that a thorough knowledge of anatomy is coupled with a full appreciation of asepsis and deftness in the execution of minor surgical interventions in the mouth and jaws.

Of the chapters which are especially attractive we would mention that on the Preparations for an Operation, in which instrumentarium, apparatus for sterilization, and the operator's and patient's position, clothing, etc., are briefly described. In the fairly extensive chapter on Anesthesia, both general and local, altogether too little space (hardly two pages) has been given to nitrous oxid and oxygen, although it is significant that in the writer's opinion, "This method of general anesthesia is the only one justified in stomatology, though only in certain well-selected cases." In the subdivision of Local Anesthesia too much space is devoted to terminal infiltration anesthesia of single teeth by novocain-suprarenin, especially in the mandible, where conductive anesthesia is most favorably indicated. Objections can justly be raised to the writer's advocacy of injection at the incisive foramen, the use of steel needles, and his misgivings regarding the certainty of success of conductive anesthesia by injection at the maxillary tuberosity, the advantages of tincture of iodin for disinfection of the place of insertion of the needle, the usefulness of massage of the injected area, etc.

In the chapters on Extraction of Teeth, Difficult and Impossible Extractions, and Accidents During and After the Operation, many very useful suggestions are offered, enhanced by sixteen most artistic plates which illustrate beautifully every detail in the operator's and patient's positions, the manipulation of the forceps, and the technique most suitable for the successful removal of each tooth, together with a profusion of text illustrations showing various forceps and their application, and a variety of elevators and their manipulation.

In the chapters on Dental Cysts, Tumors Not Due to the Dental System, viz, polypus, fibroma, angeioma, sarcoma, carcinoma, and mucous cysts, the beautiful colored plates are of inestimable value in differential diagnosis; the methods of operative procedure are clearly described, though perhaps the conciseness in these descriptions is too great to encourage the beginner toward undertaking any of these operations in his private practice. The author's dissuasion from major operations is most commendable, when coupled with his determined effort to aid the practitioner to recognize serious pathological conditions in which any delay of a major operation involves grave danger.

The Removal of Impacted Teeth, the Surgical Treatment of Chronic Periodontitis and Necrotic Conditions, Replantation and Resection of Roots, lie within the scope of the general practitioner, who in the chapters treating upon these operations will find valuable information and able guidance.

The chapter on Empyema of the Antrum is not up to the standard of the others; the general practitioner would surely prefer in its stead a short treatise on fractures, without which, to our conception, a text-book on oral surgery is incomplete.

The use of hydrogen dioxid as an antiseptic has for good reasons been entirely abandoned by oral surgeons in this country, and their example deserves the writer's emulation. Some of the operations seem too extensive according to American teaching, especially the unnecessarily large size of gingivo-periosteal flaps reflected, and alveolar plates excised.

The technical execution of the book is excellent; the colored plates especially,

which are reproduced from paintings made by a high-class artist, and compare not unfavorably with color-photography.

Essentials of Orthodontia, with Special Reference to Nomenclature, Including an Outlined Course in Practical Technics for Students. By Van Broadus Dalton, D.D.S., Professor of Orthodontia, Exodontia and Anesthetics, Ohio College of Dental Surgery. With 167 illustrations; 103 pages. Price $1.25 net. Philadelphia: P. Blakiston's Son & Co.

This primer on orthodontia will be welcome to the dental college teacher who is expected to impart to the student an amount of the theory and practice of orthodontia sufficient to enable him to diagnose a case of malocclusion and to judge for himself whether he is able to undertake its treatment, or whether the transfer of the case to a specialist is required. Any practitioner, also, desirous to take up a specialty, may find this short treatise to be a valuable guide as to his fitness and liking for orthodontia. If the subject-matter presented in such brief form proves attractive to him, he may use this booklet as a stepping-stone to more thorough and pretentious works. The introductory chapter is devoted to Terminology, Angle's classification being adhered to. The chapters on Occlusion, Etiology, Facial Art (viz, the study of facial harmony), Impression and Model-making, Band-making and Soldering, Methods and Appliances, and Retention, follow each other in logical sequence. Of special value we consider the Technic Course, in which various exercises essential in the practice of orthodontia are described, and by which the student may test his inclination toward, or unfitness for, this specialty.

The illustrative material is good and liberal.

Dental State Board Questions and Answers. By R. Max Goepp, M.D., Professor of Clinical Medicine at the Philadelphia Polyclinic; Associate in Clinical Medicine at Jefferson Medical College, etc. Octavo, 428 pages. Cloth, $2.75 net. Philadelphia and London: W. B. Saunders Co., 1912.

While, at first sight, the title of this book might well cause a frown of disapproval from him who condemns parrot-learning, "cramming," "spotting the professor," "ponies," and all the intricate paraphernalia of the emergency student, a close perusal will show a fairly analytical arrangement of the subject-matter presented in the form of questions "collected from the lists during the last few years in the various dental journals, which are representative of the kind of questions asked by state board examiners in all the states of the Union." These questions, and the answers—in most cases quite elaborate—given thereto, cover practically the entire scope of the respective subjects as far as the dental candidate is expected to master them. Therefore the student who has attentively followed lectures and has done a fair amount of collateral reading of text-books will find this volume to be a welcome control of his stock of knowledge—a useful repetitorium, as the Germans call it, while the drone will scarcely be able to make up for his idleness in short order.

A very complete index is appended for the purpose of facilitating reference to any subject on which information is desired, and of imparting to the book the value of a ready reference handbook for dental practitioners.

R. H. R.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

RESEARCHES UPON THE ENDAMŒBA BUCCALIS. By Dr. Angelo Chiavaro, Rome.

In a paper read before the American Dental Society of Europe, at its annual meeting at Paris, July 30 to August 1, 1914, Dr. Angelo Chiavaro, professor of dentistry in the Royal University of Rome, Italy, communicated the results of his investigations on the *Endamœba buccalis* in its relationship to pyorrhea alveolaris. The results of the researches of Dr. Allen J. Smith and Dr. M. T. Barrett, of the University of Pennsylvania, were published in the August issue of the Dental Cosmos, p. 948, under the title "The Protozoa of the Mouth in Relation to Pyorrhea Alveolaris." The coincidence characterizing the findings of these three scientists, who were entirely unaware that simultaneous investigations in this special field were being carried on in America and Italy respectively, proves once more the futility and comparative fruitlessness of attempts at establishing the rights of priority in exact science, which, given similar premises, cannot but arrive at similar conclusions, thus emphasizing the universality of Truth.

Endamœba buccalis—*Prowazek.*

A, Changes in shape in the course of three minutes in living unstained specimen in pus from a pyorrhea pocket.
B, Specimen stained with iron-hematoxylin. *n*, Nucleus. *v*, Vacuoles containing chromatin, the remnants of nuclear substance, probably of leucocytes.

[Professor A. J. Smith, to whose courtesy we are indebted for the opportunity of presenting the above drawings to our readers, says: "The drawings are made to the same scale, here indicated. Occasionally very slightly larger examples are found: smaller examples are frequent."]

In 1904, Prowazek, in *Arbeiten des Kaiserlichen Gesundheitsamts*, vol. xxi, described under the name of *Endamœba buccalis* an amœba which he found in the cavities of carious teeth. The following year, Leyden and Loewenthal found the same parasite in the detritus of a carcinoma in the mouth of a woman of sixty years, but ascribed no etiologic significance to it. The endamœba buccalis described by Prowazek is probably identical with the amœba gingivalis of Gross (1849), with the endamœba buccalis of Steinberg (1862), the amœba dentalis of Grassi (1879), and the amœba found by Flexner of Baltimore in 1892 in a mandibular abscess. The suspicion of these investigators that the endamœba buccalis was not an independent form, but rather represented a stage of development of some of the endamœbæ which are found as intestinal parasites, was apparently confirmed, because of the fact that the endamœba buccalis had never been found by them in a state of encystment. Its re-

lation to oral diseases also remained unknown.

Chiavaro's researches have been directed (1) to studying the morphological character of the endamœba buccalis; (2) to making deductions therefrom, if possible, as to the independent form of this amœba; (3) to observing the relationship between the presence of endamœba buccalis and oral disease and solving the question of its pathogenicity.

For the author's microscopic observations upon the morphological characteristics of the endamœba buccalis and its mode of reproduction, material was collected from 68 cases, partly with sound teeth, partly with oral diseases. Some of the slides were treated by the dry method and stained with Giemsa mixture (azure II eosin dissolved in glycerin with addition of methylic alcohol), others were fixed with Schaudinn's liquid (alcoholic-acetic sublimate) and colored with Ehrlich's hematoxylin or with Heidenhain's ferric hematoxylin. Only a few observations were made upon the living endamœbæ, but these were sufficient in number to verify the statement of others that the pseudopods are always few and lobular. When fixed and stained, the endamœba is oval, almost round, varying from 5 to 20 micromillimeters in breadth, according to others between 6 and 33 micromillimeters. In the fixed specimens ectoplasm and endoplasm can no longer be distinguished as in the living parasite. Generally there is one nucleus, sometimes two, exhibiting more or less the same characteristics, no matter what method of fixation has been employed, viz, it is round, relatively small, vesicular, with a well-defined membrane and very clear karyosome (central corpuscle).

"The chromatic nuclear substance, always very scarce, is divided between the karyosome and some small masses adhering to the membrane. These masses sometimes are not distinguishable, sometimes there are two situated one against the other; in other cases there is a single mass on one side. The karyosome sometimes appears to be single, almost round; sometimes it is divided into two symmetrical halves, sometimes it is formed by three portions. Some threads of chromatic substance extend from the karyosome to the membrane."

"The structure of the nucleus can be well observed only in microscopical preparations stained with ferric hematoxylin. The chromatic substance and nuclear membrane are stained red-violet, the remainder of the nucleus blue, more or less deeply, if the specimen is stained with the Giemsa mixture. If Ehrlich's hematoxylin is used, the nucleus remains very pale and is often hidden by nutritive vacuoles which are scattered all over the protoplasm and which take the stain intensely. It is specially noteworthy that there are a very great number of bacteria inclosed in the protoplasm, having evidently been ingested by the endamœba.

"Respiratory (contractile) vacuoles are always absent. Sometimes the nutritive vacuoles are absent, but sometimes they are present in great number. Generally, the larger the endamœba, the more numerous these vacuoles, which sometimes number twenty and more."

All these observations Chiavaro illustrated by very perfect drawings and slides.

In regard to the reproduction of the endamœba, which was first described by Prowazek as consisting simply in a division into two, Chiavaro, in contradistinction to Loewenthal, maintains that the karyosome indirectly divides itself; one equatorial plate and one spindle are formed in it, while the rest of the nucleus remains intact. After the separation of the equatorial plate into the lateral plates, the nucleus divides itself into two.

Over and above these observations, which largely confirm those of other writers, Chiavaro has been able to demonstrate that the independent form of endamœba buccalis develops in the oral cavity, and he showed the process of its encystment by drawings from microscopic specimens stained with Giemsa mixture, demonstrating the formation of a cyst membrane. This observation establishes the endamœba as an independent protozoon, apart and separate from the other endamœbæ found in man. Chiavaro is of the belief that the endamœba buccalis can be transmitted directly from one individual to another.

The most interesting portion of Chiavaro's paper from the dental practitioner's point of view was the chapter on the endamœba buccalis in relation to conditions of the teeth and the oral cavity. The material was collected from the mouths of patients in the Royal Dispensary of the Dental School at the Umberto I. Policlinic in Rome, and the find-

ings were most conscientiously tabulated. These extensive tables show that no endamœbæ were found in the soft deposits taken from the interdental spaces of sound teeth kept clean with brush and dentifrices, while in the soft deposits gathered from the interdental spaces of the same patients after their teeth had not been cleaned for several days for the sake of experiment, they were found to be present. By "soft deposits," which Chiavaro aptly designates as "materia alba," is meant the soft, whitish viscous mass deposited in the interdental spaces and upon the crown surfaces of the teeth, especially near the gum margins, consisting of soft salivary deposits, mucus, epithelial cells, and food débris in a more or less advanced state of decomposition, and harboring a great variety of micro-organisms.

Hard tartar was found to contain endamœbæ in only two cases in which the tartar was mixed with pyorrheal pus. Even in mouths in which the pyorrheal pus contained a profusion of endamœbæ, they were absent in hard tartar which had been washed in running water.

In the débris collected from carious cavities, the endamœbæ were absent in fifteen out of twenty cases, though in the same mouths they abounded in the white deposits collected from teeth remote from those affected with caries.

In two cases, all the teeth were affected by deeply penetrating caries, but neither in the cavities nor in the soft deposits were any endamœbæ found, although these mouths were in the worst hygienic condition imaginable. Hence it appears that the endamœba cannot live in an acid medium.

The endamœba has been invariably found in the purulent discharge in cases of pyorrhea alveolaris, twenty-one of which were examined. In one case of pyorrhea the protozoa were found upon the first examination, but could not again be detected, after treatment with agents containing inorganic acids had been instituted.

Endamœbæ were also demonstrated in two cases of orange-yellow deposits upon the teeth, but were not present in greenish deposits.

No endamœbæ could be discovered in gangrenous dental pulps nor in the pus discharging from a fistula opening upon the face, but they were present in large numbers in the pus collected from a large alveolar sequestrum.

From these findings, the author draws the following conclusions:

"1. The endamœba buccalis occurs encysted in the oral cavity, hence does not represent merely a transitional stage of other endamœbæ, but an independent form.

"2. The endamœba is found in the pus of all cases of pyorrhea alveolaris.

"3. It is generally present in the soft deposits upon sound teeth which are not kept in good hygienic condition.

"4. It is not found in carious cavities in which the pathological process of decay is actually going on, and which therefore represent an acid medium.

"5. It is absent in hard tartar.

"6. The endamœba has no pathogenic action; on the contrary, as it feeds on bacteria, it is most probably an adjuvant in the autodisinfection of the mouth."

[*New York Medical Journal*, New York, May 30, 1914.]

WHO CAN TAKE AN ANESTHETIC? (EDITORIAL.)

Modern surgery has robbed the most difficult surgical procedure of its dangers. The surgeon wizard of today can enter any of the body cavities with comparative safety and perform feats of dexterity little short of marvelous. Yet any operation, however slight, is fraught with danger to life, owing to two incidental factors—surgical shock and anesthesia. Even in the hands of experts an anesthetic may prove fatal in a given case, the possibility of such a calamity being in inverse proportion to the experience of the anesthetist. No wonder the patient dreads the anesthetic, while the surgeon is continuously hunting for a safe agent which is yet to be found. While it is generally true that ether is safer than chloroform, yet some surgeons have operated on hundreds of patients under chloroform without a single fatality, while others have experienced fatal results from ether. Generally, the contraindications to general anesthesia are known, yet in a given case it is difficult to foretell the possible effect of the anesthetic. Patients with valvular heart disease, renal disease, atheroma, and other conditions which are supposed to contra-indicate the use of a general anesthetic, have been carried through

even prolonged anesthesia safely. One thing, however, is certain, viz, that general anesthesia is particularly dangerous to persons suffering from myocardiac changes, a condition which does not permit of ready recognition. For this reason the simple test suggested by Dr. W. A. Schtange in *Roussky Vratch*, January 18, 1914, will be welcomed by the anesthetist, if further experience should verify the doctor's assertions. This test is based on the fact that a healthly person can suspend breathing from thirty to forty seconds. This, the author states, depends, not on the lung capacity, but on the vigor of the heart muscle. In persons with weak hearts, the time is shortened to twenty or even ten seconds. The patient, seated in a chair, is told to make a moderately deep inspiration and with the mouth closed to hold his breath as long as he can. The shorter the time the patient can suspend breathing, the greater the danger of an anesthetic, the latter being contra-indicated if the time is less than twenty seconds.

[This Schtange test should prove of great value to the dentist, before inducing general anesthesia by nitrous oxid and oxygen anesthesia, or local anesthesia, especially because, unfortunately, most patients are loath to undergo a thorough physical examination by the dentist.]

[*British Dental Journal*, July 1, 1914.]

TUBERCULOSIS IN RELATION TO DENTAL DISEASE. BY DR. H. VALLOW.

There are certain non-tubercular changes in the mouth frequently occurring in tuberculous patients which have a distinct importance in the diagnosis, prognosis, and treatment of consumption. The commonest affections of the mouth of tuberculous patients are stomatitis and dental caries. By the aid of statistics, Vallow tends to show that dental caries is more prevalent among tuberculous than among healthy children, and he considers it preferable to remove carious teeth in tuberculous patients even during childhood, instead of allowing them to remain in order to preserve the shape of the permanent teeth, because of the possibility of infection. He thinks that carious teeth act as the invasion point in some cases of tuberculosis. From the teeth, infection may take place in one of the following ways: (1) Through the submaxillary glands, then the superficial and deep cervical glands, later the glands in the mediastinum, later still the glands at the root of the lungs, viz, the bronchial glands, and from these glands to the lungs themselves; (2) through the submaxillary glands, then the superficial cervical glands, then Philip's glands behind the clavicle, and from these to the pleura (Philip); (3) or directly into the bloodstream. Even if infection does not take place through the tooth, it can act as a place of lodgment of tubercle bacilli, from which they can be conveyed to the tonsil, and infection take place through that organ. Whatever the mode of infection, whether through the tooth or the tonsil, carious teeth are dangerous, and should therefore be removed.

Every tuberculous patient should have the teeth efficiently attended to, and for that purpose a dentist of repute should be attached to every tuberculosis dispensary, acting in conjunction with the tuberculosis officer. The money thus spent will be well invested and pay a very good interest. Means should be found for the inspection of all children's teeth, and any defect remedied immediately. It is of the utmost importance that the nose, throat, and teeth should be attended to in every community, as persons with healthy nose, throat, and teeth escape many of the common ills of life, and as a preventive measure it might be advisable for these affections to be controlled by a public health authority. The inspection of the teeth should be done by efficient nurses, specially trained in the work, each taking a portion of the district as her area, and referring necessitous cases to the dentist attached to the dispensary, or some other branch of the local authority.

[*Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, April 1914.]

A CASE OF RUMINATION IN MAN. BY DR. RUDOLF KLEIN, KREMSIER.

The patient, a young man of thirty years, inclined to be stout, presented with considerable shyness for the restoration of an unsightly carious incisor. Upon examination, a viscous coating of the teeth, advanced caries of all molars, and acid fetor were noted. Upon being questioned, the patient confessed to the habit of rumination, which in his case was acquired owing to the

lack of masticating efficiency. While a university student, the patient had not been able to eat as fast as his fellow students, and he had therefore acquired the habit of bolting his food, and retiring after about an hour to his residence, where in a prone position he would ruminate. The process is not distasteful nor uncomfortable to the patient, the act of rumination consuming about thirty minutes. By way of etiology the habit is explained by chronic dilatation of the stomach with subsequent relaxation of the pylorus. It remains a psychological riddle, however, that the patient is perfectly satisfied to persist in his habit. E. Mayrhofer has reported a case of rumination in an infant. He refuted the idea of pylorospasm, since in his, as in the writer's case, the act of rumination is inaugurated by voluntary masticating motions. K. Huldschinsky in *Zeitschrift fuer Kinderheilkunde*, No. 5, 1913, reports the case of an infant of six months, which is similar to Klein's case, inasmuch as the act of merycism was performed only when the patient enjoyed perfect quiet. With the case reported by Pitsch (see DENTAL COSMOS, September 1909, p. 1230), Klein's case is similar in regard to the patient's very poor dental equipment, and in persistence in the habit, which he did not regard as disagreeable.

[*Le Sud-Est Dentaire*, Marseilles, January 1914.]

BALDNESS OF DENTAL ORIGIN. BY DR. FERRIER AND DR. SCHMELTZ.

[*Bull. du Syndicat des Chir.-Dentistes de France*, Paris, November 1913.]

TWO CASES OF ALOPECIA OF DENTAL ORIGIN. BY DR. PUTEAUX.

The case reported by Drs. Ferrier and Schmeltz was that of a woman who presented on account of oral conditions. At the time of examination, several bald areas on her head were noted. She gave a history of fairly good general health, but of daily suffering from migraine, localized chiefly in the region of the forehead and the left side of the occiput, which was painful on pressure. She had noted small pimples on the head and marked itching for three weeks, and corresponding to the appearance of these symptoms the loss of hair was more abundant. One of the areas free from hair was situated on the right temple, another in the center of the left parietal region, and the largest in the occipital region, all of these areas being painful upon touch with the comb. Of teeth, little more than roots remained in her mouth; there was no acute periosteitis, and no appreciable pain except slight discomfort in the lower left molar region. All the roots were extracted, and the teeth that could be saved treated. Within a few months, new growth of hair was noted over all the areas affected. The writers remark that there was no pulpitis, and that the alopecia seemed to be due entirely to the infection of the alveolar process and the irritation caused thereby.

Puteaux reports the case of a patient who exhibited a bare patch on the left side. He was affected with gingivitis due to tartar on the same side. After thorough cleansing of the mouth, and the application of the cautery every other day, no trace of baldness was left after the end of two months. In the case of a boy of twelve years, alopecia was associated with advanced caries of the lower first molars. Two bare patches were found also in the sub-occipital region. Dental treatment was instituted, and within a month the affected areas were well on their way to assume normality, and three months later the child showed no trace of the trouble. Puteaux asserts that all cases of alopecia which he has observed have without exception been cured by treatment of the teeth, and that it must be admitted that many of these cases are of dental origin.

[In all the three cases reported, the possibility of pediculosis seems to have been considered with negative results, but no Wassermann tests were made, which might have disclosed the specific origin of these alopecias.]

[*Correspondenz-Blatt fuer Zahnaerzte*, Berlin, April 1914.]

LOCAL ANESTHESIA BY NOVOCAIN-SUPRARENIN, AND FACTORS AFFECTING ITS SUCCESS. BY ZAHNARZT BOLTEN, HUSUM.

In his very carefully compiled article, Bolten scrutinizes all the factors which can possibly influence the success of an injection of novocain-suprarenin solution, and reaches the following conclusions:

The principles of asepsis are to be ob-

served to the fullest possible extent in the application of local anesthesia in the mouth. It is, therefore, not sufficient to sterilize only a part of the syringe, which should be taken apart and boiled after each use. In assembling the syringe after boiling, all those parts which will come directly or indirectly in contact with the solution to be injected must be guarded against contamination by contact with other than sterilized objects. For this purpose a number of sterilized pincers should be kept in a separate receptacle. The finger which is used as a guide for the insertion of the needle or for massaging the gingivæ must be protected with a sterile rubber finger-stall or a coat of collodium. Before dipping the needle into the porcelain cup for the purpose of taking up an additional quantity of solution to be injected in one patient, the iridio-platinum or tantalum needle must be glowed out in an alcohol flame. The syringe, when not in use, must be kept fully covered with a mixture of pure glycerin and alcohol. To insure rapid, convenient, and reliable sterilization, the syringe should be made of glass and metal only, and consist of as few parts as possible, and these should have as few angles and corners as possible. The metal parts which come in contact with the solution should consist of such metals or alloys as will offer great resistance to acids. Only tantalum, iridio-platinum, or perhaps nickel needles should be employed. Tantalum has the advantage of being the hardest—hence, like iridio-platinum, it will not break upon hitting bone. The original higher expense of such needles is amply compensated for by their almost unlimited durability. Steel needles are to be condemned. After taking up the syringe from the preserving fluid, the piston must be vigorously moved back and forth several times to force out the glycerin-alcohol mixture. For the purpose of still more careful cleansing, absolute alcohol is drawn through the needle, which has previously been mounted upon the syringe, shaken vigorously and forced out by repeatedly moving the piston to and fro. The solution to be injected should remain in the syringe not a second longer than necessary, as the first traces of its decomposition appear within from two to five minutes. Metal stands for preserving the sterilized syringes in the alcohol-glycerin solution are contra-indicated, as they oxidize after some time, causing impurities to reach the interior of the syringe. A flat glass tray with ground cover is very serviceable for the preservation of the syringe.

[While Bolten's findings corroborate those of a great many investigators of this timely subject, his omission of the cleansing of the syringe with boiling sterilized water just before drawing up the anesthetic solution is to be censured, as any trace of alcohol injected into the tissues with the anesthetic solution produces an unduly prolonged anesthesia. His condemnation of metal stands for preserving the syringe is also disputable, because, if the alcohol-glycerin solution is renewed every three or four weeks, and the metal stand is thoroughly cleansed and sterilized, as should be done, no detriment will accrue from slight traces of oxidation, especially if boiling distilled water is repeatedly drawn into the syringe before use.]

["Trans. of the European Orthodontia Society," in *Oesterreichisch-Ungarische Vierteljahrsschrift fuer Zahnheilkunde*, Vienna, April 1914.]

CAST REGULATING APPLIANCES. By Dr. O. Solbrig, Paris.

The application of the casting process in orthodontia offers the advantage of saving time and pain to the patient, which is of especial value in little children, who very soon wax obstinate and fretful when bands are fitted and burnished in the mouth.

Cast appliances are made out of the mouth on a plaster model. Part of the work, such as investing, heating of the case, etc., can be done by a laboratory assistant. All kinds of modifications of the appliances can be obtained in the modeling with greatest ease, and the necessary strength, which is often wanting in narrow bands, can be given. As the weakest point of a band is the part that goes between the teeth, this part is made of stiff 20 per cent. iridio-platinum, which can be so thin that separating of the teeth is unnecessary, and the appliance can be adopted even on crowded teeth. The greatest possible accuracy can be obtained in all bands. As no D bands are used, the accumulation of food débris between the screw and the tooth is avoided, and white decay in

these places is thus prevented. It is for this reason that all bands should cover the tooth to the gum margin, or leave a space big enough to be easily cleaned. As there are only smooth surfaces on these appliances, they satisfy all demands of hygiene. Several teeth should always be united for the purpose of anchorage, which, with the casting method, does not occasion any supplementary work. In cases of classes II and III, the masticating surfaces of the molars are covered, and a smooth surface is established in such a way as to prevent the interlocking of the cusps being a hindrance during treatment. If it is important to maintain the existing normal occlusion, the masticating surfaces can be left free. The precious metal employed can be remelted. The appliances are cemented on the teeth, and allow of the combination of several methods.

As to the making of these appliances, iridio-platinum matrices are placed between those teeth which are to carry the appliances before plaster impressions are taken. These matrices are left in the impression, and remain on the model, on which the case is studied and the appliance built, bands and caps with hooks and tubes being modeled in wax and cast in the usual way. At the second visit, new impressions can be taken for the operator's collection, and the appliance be inserted in the mouth.

PERISCOPE.

To Make Corks Fit.—Now and again the only cork at hand large enough is too large, with no cork-presser available. By boiling for five minutes the cork can be made to fit perfectly.—*Country Gentleman* per *Dental Brief.*

Rinsing the Mouth with Water After Extraction Contra-indicated.—It is not advisable to rinse the mouth with water after extraction, as it is useless and facilitates hemorrhage and infection.—C. CHARLTON, *Commonwealth Dental Review.*

Incompatibility of Tincture of Iodin with Mercury.—In applying tincture of iodin to the gingivæ, it must be remembered that iodin forms toxic compounds with mercury. In patients, therefore, who are under mercury treatment, iodin cannot be applied. DR. CAVALIÉ, *Bibliographie Dentaire.*

Securing Perfect Wax Models for Cast Gold Inlays.—In order to secure a perfect wax model for a cast gold inlay, the wax is first trimmed to the desired shape with carving and modeling instruments. All accessible surfaces of the wax model are then wiped with a pellet of cotton dipped in oil of cajuput. The approximal surfaces are smoothed to below the gingival margin with a fine strip dipped in this oil.—*Oesterreich. Zeitschr. f. Stomatologie.*

Polishing Artificial Vulcanite Dentures.—After having filed and scraped a vulcanite plate, instead of using any sandpaper, a mixture of one part of emery powder and three parts of powdered pumice is employed for finishing and polishing, affording considerable economy in time.—*Le Laboratoire et le Progrès Dentaire.*

Deodorizing Large Cavities.—Large cavities in teeth can be easily deodorized by dipping a pellet of cotton, held in cotton pliers, into water, taking up a small quantity of sodium perborate, which has been placed on a porcelain or glass slab, and quickly introducing this dressing into the cavity. The oxygen developed renders the cavity odorless, and relatively aseptic.—A. PATIÑO, *La Odontología Colombiana.*

Removing Vulcanized Rubber from the Pins of Porcelain Teeth.—In removing porcelain teeth from plates, the vulcanite is found to stick to the pins and to cause considerable trouble in attempts at removal, especially from gum sections. This difficulty can be easily overcome by holding the teeth with mechanical pliers over an alcohol flame. The heat is transmitted through the porcelain to the pins and through these to the rubber, which expands and can then easily be removed.—S. GONZÁLEZ, *La Odontología Colombiana.*

Comfortable Method of Retracting the Cheek Muscles in Filling Operations.—In restoring the buccal surfaces of upper or lower molars, we frequently encounter difficulties in keeping the masticatory muscles from interfering with the filling operation. A method which is far more comfortable for the patient than a cheek retractor consists in passing a copper or iron wire of suitable size through a cotton roll or rolled dental napkin, and bending it to fit the curvature of the jaw. This simple contrivance will effectually hold the cheek away from the field of operation.—S. CARRASQUILLA, *La Odontología Colombiana.*

Delusions About the Relationship of Potassium Sulfocyanate in the Saliva to Dental Caries.—Dr. Kantorowicz and G. Speyer have repeated the experiments made by many investigators, but with negative results. Their own experiments show that sulfocyanate neither retards the development of, nor kills bacteria accumulated in the mouth, and that it has no influence upon the formation of acids from carbohydrates. Neither is it possible to establish any relationship between the sulfocyanate contents of the saliva and the frequency of caries, or to prove a favorable action of potassium sulfocyanate in gingivitis and pyorrhea alveolaris. On the other hand, potassium sulfocyanate has the undesirable action of producing diarrhea.—*Deutsche Monatsschr. f. Zahnheilkunde,* per *Zahnaerztliche Rundschau.*

Sterilization of Engine Handpieces by Paraffin Oil.—A method which has been largely adopted in private and clinical practices in Scandinavia and Holland for the sterilization of engine handpieces consists in immersing them in paraffin oil and heating for three minutes up to 130° C. This renders it possible quickly to sterilize the handpiece before or after each use. The perforated tray of the sterilizer allows the hot oil to run off the sterilized instruments. By means of a thermometer, the heat of the oil is watched, as overheating must be avoided. This method of sterilization is not ideally perfect from a bacteriologist's point of view, but it offers safety against infections with tuberculosis, syphilis, pyogenic bacteria, etc. Moreover, before being sterilized, instruments or handpieces can be cleansed with soap and water and brush without risk of their rusting, as the hot oil dries and lubricates them. —V. ANDRESEN, *Deutsche Zahnaerztliche Wochenschrift.*

Value of Mask Over Surgeon's Mouth. —In order to demonstrate the value of a mask over the surgeon's mouth during operations, Candler carried out the following experiments with bacillus prodigiosus: With ordinary breathing and quiet speaking, no bacilli left the mouth. Coughing for two minutes caused only a few bacilli to be emitted, and these were controlled by a mask of eight layers of gauze, one of four layers being insufficient. Sneezing was shown to be a most dangerous source of infection from the mouth, one sneeze, and that an artificial one, producing 130 colonies of micro-organisms in a circle of 3½ inches diameter at a distance of 18 inches. A mask of eight layers is not sufficient to keep back all organisms during prolonged sneezing, although it reduces the infection considerably. There was, however, no growth on a plate exposed to a sneeze through such a mask.—*Brit. Med. Journal,* per *Journ. Amer. Med. Association.*

Hallucinations During Dental Treatment.—During the retrial of a case of alleged assault during dental treatment before the court of appeals at Hanover, the experts, viz, Professor Dr. Bruns, specialist in nervous diseases, Dr. Brandt, medical councillor and district physician, Dr. Hirsch, a practicing physician, and Dr. Dorn, a dentist, favored acquittal of the defendant, pointing out that anemic, hysteric, and chlorotic female patients occasionally during fainting spells have hallucinations which upon awakening they claim in good faith to have experienced in reality. It was emphasized that such hallucinations may occur in both sexes during apparently full consciousness, especially during dental treatment. Such patients, when spoken to, answer all questions. But, upon completion of the treatment, they claim to have been assaulted, etc., and these hallucinations are so real to their minds that frequently the operator is dragged into court.—*Zahnaerztliche Rundschau.*

To Prevent "Blowing-up" of Solid-Bottom Flasks.—Anyone who has to work with flasks of which the lower portion is in one piece, knows how frequently the heating-up of the flask previous to packing results in the steam forcing the plaster out of the flask, and occasionally projecting it to a distance, with serious risk of fracturing some essential portion of the investment. Various methods have been tried to prevent this unpleasant "popping," the most usual being the coating of the inside of the bottom piece of the flask with soap or French chalk, before

pouring-in the plaster. But even then, in spite of all care in heating-up, an "explosion" occurs every now and then. It is stated that, if we draw a thin line of wax with a spatula across the inside of the flask from edge to edge, before pouring the plaster, the wax melts into it when heated, and so provides a vent for the escape of the steam as it forms, allowing of more rapid heating, and entirely avoiding any chance of the flask "popping."—*Edwards' Dental Quarterly.*

Orthodontia Appliances by Mail Order.—I cannot help but voice my cry against a field of abuse which is already moving with the marvelous rapidity of gross insult to the fundamental principles of an almost exact science—one which within two decades has produced results enough to satisfy the extreme pessimist relative to its wonderful possibilities. I refer to orthodontics. Strange as it may seem, although this specialty has contributed volumes of dental literature regarding its methods of diagnosis, treatment, and prognosis, it has nevertheless failed miserably in being immune to orthodontic abuses. Its field is already invaded by the so-called *Orthodontic mail-order laboratory specialist* who tempts the dental practitioners to regulate irregularities of the teeth with appliances fitted to crude models, regardless of conditions which necessitate extreme care in obtaining a comprehensive understanding of the etiology, diagnosis, and prognosis. Such methods cannot help but sow the seed of discontent among practitioners and thus retard the teachings of true orthodontic knowledge.—M. N. FEDERSPIEL, *Dental Review.*

Etiology and Prophylaxis of Anomalies of the Teeth and Jaws.—In his opening address to the fifth annual meeting of the German Association for Orthodontia, Prof. W. Pfaff deplored the lack of attention given to this aspect of the work by the dental profession generally. "To put it briefly, we have at the present day not gotten beyond a problematical understanding of the causes of tooth and jaw deformities." Naturally, this is not without an effect on prophylactic measures. The cause of this lack of interest he attributes to the failure, until quite recent times, of any systematized investigation supported by experiment. This may in turn be attributed to fault in the dentist's training, during which he hears far too little of orthodontia and etiological questions. Even at conferences the subject is rarely discussed by itself. Pfaff, as showing the importance of etiology, instances the effect of such diseases as rhachitis, scrofula, and osteomalacia on the skeleton, and with it the jaws and teeth. The problems of heredity also call for elucidation. Good work has been done by individuals, but carefully planned investigation by many workers is necessary to the elucidation of the many problems involved.—*Universal Med. Record.*

The Stability of Wax.—Of the wonderful unchanging nature of the waxes, organic or mineral, with time, and their indifference to the environment within certain temperature ranges, a most remarkable illustration is given in a communication recently to the Chemical Society on some medieval wax seals. The authors, Messrs. J. J. Dobbie and J. J. Fox, gave an account of the examination of the composition of a number of medieval seals, ranging in date from the thirteenth to the beginning of the sixteenth century. They were found to consist of beeswax alone, or of beeswax mixed with resin in various proportions. The resin could not be identified except in two cases, in which it gave the reactions for colophony. The red seals were colored with vermilion, the green with verdigris, the brown and black with verdigris and organic matter. The beeswax which formed the sole constituent of an impression of the Great Seal of 1350 was practically unaltered in chemical and physical properties, except as regards its power of absorbing iodin, which was slightly less than that which beeswax usually exhibits. Solid paraffin (so-called "paraffin wax") of course owes its name to its chemical inertness, and hence makes a far from "temporary" root-filling.—*Brit. Dental Journal.*

Zinc Dies Directly from Impressions.—When a swaged metal base is required for a denture, the following method for obtaining a zinc or Babbitt metal die directly from the impression is useful, especially in cases where deep undercuts are present, and good cores more or less difficult to procure. The impression of the mouth for which a metal base is to be swaged is taken in a mixture of plaster of Paris two-thirds and pumice one-third. Instead of pumice, any other suitable investment material may be used. If undercuts are present, and the impression breaks on being removed from the mouth, it is best to cement the pieces into place. If possible, the impression is removed from the tray, although it is not necessary to do so. Then, with the same material as has been used for taking the impression, its sides are built up at slightly obtuse angles and high enough to allow of a fairly thick die.

When hard, this is thoroughly dried, and

the die metal, having been melted, is poured into this mold. When the metal has solidified and is cool enough to be manipulated, the mold and impression are broken away, and a perfect metal model is thus obtained, from which a lead or any other counter-die may be procured and the plate swaged as usual. If two dies are needed, two impressions must be taken.—E. SCHER, *Items of Interest.*

Description of Various Splints for Fractured Jaws.—The Hammond or Interdental splint is a wire splint which fits accurately around the teeth, both on the labial and lingual sides. After being pushed over the teeth, the splint is bound in position by iron wire passing between the teeth. This splint may be made of German silver. The Hayward or Kingsley splint is composed of a vulcanite cap which fits accurately on the teeth, from the sides of which two wings project so that, when the vulcanite cap is in position, the wings lie outside the mouth, one on each side, stretching back as far as the posterior border of the rami.

The Gunning splint consists of two vulcanite caps, one fitting on the maxilla and one on the mandible, these two caps being joined by anterior and posterior pillars. The Hern splint is simply a modified Gunning; it is composed of a vulcanite cap fitting over the mandibular teeth, pillars being built up from this, the tops containing troughs which are filled with gutta-percha, the maxillary teeth being jammed into it. Angle's splint: The first molars are banded with bands similar to ordinary regulation bands. The canines are also banded, the two jaws being fixed in occlusion by ligating the molar bands and canine bands together by a figure-of-eight ligature.—E. E. SPENCER, *Brit. Dental Journal.*

Management of Fractures of Teeth which Do Not Involve the Pulp.—Tooth fractures may involve a small corner of enamel or a large portion of the lingual plate of an incisor or a cusp of a molar or bicuspid. In the great majority of such cases it is good practice to cover up the exposed dentin with cement without making any attempt to prepare a cavity for the reception of a more permanent filling. When the pulp is almost exposed, if the patient be young, the cement will protect the pulp from irritation until secondary dentin forms to help in its preservation. Even if there be very little dentin exposed, the shock to the tooth which caused the fracture may cause the death of the pulp, which can only be known by the lapse of time. If only a very small portion of dentin be exposed, it is well to cover it, even though there be no intention of inserting a more permanent filling afterward. It will protect the pulp and dentin from irritation until such time as nature can do it herself. If vital fractured tooth tissue is well sterilized, and the surface dried and then moistened with phosphoric acid, there is no difficulty in attaching cement if contours are not attempted. Small fractures of the enamel should be ground smooth and polished. Bad results have often occurred from meddlesome attempts to restore corners of teeth with gold or porcelain.—A. E. WEBSTER, *Dominion Dental Journal.*

Differential Diagnosis Between Carcinoma and Syphilis.—Carcinoma and syphilis manifest many points of similarity, but show predilection for the tongue, lips, and tonsils; but carcinoma at the beginning grows very slowly, and it is only after months have elapsed that the epidermis is eroded and the hard cartilage-like border is formed, although as the lesion progresses, the rate of growth rapidly increases, accompanied by ulceration, glandular enlargement, and cachexia.

We differentiate the primary lesion from the early erosive stage of carcinoma on the basis of age, since syphilis commonly attacks young persons and carcinoma elderly ones. The malignant growth is usually laterally placed, the chancre centrally. On the tongue, the chancre is rarely on the base and underside, while on the gums, mucous membrane, and palate, carcinoma is the more frequent of the two lesions. Furthermore, the carcinoma possesses an elevated border, which the chancre does not; the secretion of the carcinoma is bloody and purulent, while that of the chancre is mainly serous, and the odor of the malignant growth is often characteristic. The pain of carcinoma is severe, the initial rate of progress much slower, and the glandular involvement occurs much later; and finally the spirochete, microscopical examination of tissue, or the therapeutic test will differentiate the lesions.

The secondary lesions, in the ulcerative form, develop more rapidly than carcinoma, are multiple, comparatively painless, and show no glandular enlargement or rolled cartilaginous border.

The gumma is differentiated by its more rapid progress, lack of regional glandular development, character of the ulcer, *i.e.* undermined edges and necrotic adherent base, the ready response to medication and the microscopical examination of tissue.—D. FRIEDLANDER, *Pacific Dental Gazette.*

Indications for the Amount of Oxygen Required in Nitrous Oxid and Oxygen Anesthesia.—Since the amount of oxygen in the mixture of nitrous oxid and oxygen controls the depth and character of anesthesia, we are constantly required to determine whether too much or too little oxygen is being used. The following symptoms—no one of which is infallible, of course—aid in this determination.

Too little oxygen may produce—Muscular twitching, becoming clonic spasms or jactitation; panting respirations; retching or vomiting; progressive cyanosis; sudden blanching (rarely); dilated pupils; spastic rigidity of muscles; hesitating respiration with prolonged expiration; cessation of respiration from muscular spasm.

Too much oxygen may produce—Voluntary or reflex resistance; superficial slow respiration; retching or vomiting (rarely); increasing pink, becoming bright; active pupillary reflex; reflex resistance about incision; prolonged inspiration; holding of breath; talking, crying, etc.

Pulse and respiration are usually accelerated when the patient is under the influence of nitrous oxid and oxygen, but when these gases are properly administered the blood pressure is not influenced. The volume of respiration or the amount of gas inhaled at each breath is subject to considerable variation, but in the average case amounts to 500 cc. About thirty respirations per minute is the most frequent rate. Neither the rate nor the volume of respiration means much in itself, but the amount of gas consumed per minute, which represents the ventilation of the lungs, is of importance.—E. I. McKesson, *Dental Summary.*

Oral Sepsis and Vaccine Therapy in Dental Practice.—G. W. Ross states that the effects of pyorrhea alveolaris may be local, adjacent, distant, and systemic. The distant and local pathological changes are to be found in the gastro-intestinal tract—causing the symptoms associated with so-called indigestion and at times diarrhea; in such respiratory disorders as bronchitis, etc.; in certain forms of chronic arthritis; in certain cases of so-called neuralgia or neuritis, sciatica, etc.; possibly in psoriasis, certain eczemas, and urticaria. Among the systemic effects are mental and physical inaptitude, secondary anemia, and, according to some authorities, even pernicious anemia. The author has treated a considerable number of cases of chronic arthritis in which the following principles have been relied upon: (1) Search is made for a focus of infection. This is most commonly found in the mouth—pyorrhea alveolaris, chronic alveolar abscess, etc., or the tonsils may be chronically inflamed; or there may be inflammation of the bladder or prostate, of the uterus, etc. (2) The micro-organisms found there are isolated, and autogenous vaccines are prepared, and used to help control the local infection. (3) The focus of infection is eradicated, if possible. (4) The endeavor is made to correct deformities by appropriate orthopedic measures.—*Amer. Medicine,* per *New York Med. Journal.*

Forcing a Tooth or Root into the Maxillary Antrum or a Cyst in Extracting.—If a tooth is forced into the maxillary sinus, it is removed more easily than a root, as the opening created is larger, and a tooth can be grasped with anatomical forceps and removed. A small root which may slip into the cavity through a small opening offers more difficulty as to removal. The proper procedure is to make an opening large enough to remove it, as a maxillary sinusitis will most likely result if the root is left *in situ.* A radiograph will facilitate the localization of the root if it cannot be reached readily. The opening should be made by preparing a mucoperiosteal flap, *i.e.* dissecting the mucous membrane and periosteum away from the bone, cutting away sufficient bone to remove the root, and then suturing the mucoperiosteal flap to close the opening. If the antrum is in a healthy state, nothing should be introduced into it but normal saline or boric acid 2 per cent. solution, then the cavity is closed.

If, while extracting, the operator enters a cavity, he should bear in mind the possibility of a cyst and not take it for granted that he is in the antrum. The differential diagnosis depends upon the following points: (1) A cyst contains liquid or semiliquid material. It is a good plan to wash out the cavity with a sterile saline solution, and note the appearance of the liquid as it returns. (2) A cyst, unless it has involved the antrum, will not permit passage of air from the nose into the antrum and thence into the mouth. (3) The radiograph will confirm the diagnosis. If the cavity entered proves to be a cyst, this of course must be treated accordingly.—W. J. Lederer, *Dental Outlook.*

OBITUARY.

DR. GEORGE EDWIN HUNT.

[SEE FRONTISPIECE.]

DIED, July 11, 1914, at Indianapolis, Ind., of acute gastritis, in his fifty-first year, GEORGE EDWIN HUNT, D.D.S., M.D.

An Appreciation.

"Nor blame I Death because he bare
The use of virtue out of earth;—
I know transplanted human worth
Will bloom to profit otherwhere.

"For this alone on Death I wreak
The wrath that garners in my heart:
He put our lives so far apart
We cannot hear each other speak."

Custom has decreed and experience approved that records be made, that life and even love be written about; that somewhere a tabulation shall be made for these sacred things in order that those who tarry, or those who come after, may know that all was not vain, all was not disappointing—but in the living and the loving there was a brief but great joy.

There are many ways to say the same thing, but there is only one way for me to talk about the life and personality of "Ed" Hunt, and that is the intimate and personal one, because my love for him was more intimate and more personal than that of a brother. No crisis in his life that was not mine, no garlands he gathered that were not shared with me, no hopes, no ambitions, of which I was not freely informed. In the early days of our acquaintance there rapidly grew a degree of intimacy, a comradeship, which is usually obtained only by years of close contact, but which I attribute to a mutual attraction and keen appreciation on my part of his sterling worth and fine character, his charming graces and loving heart. I claim no priority or right of discovery in these, for he had scores of friends who loved him and appreciated his worth long before we met; but I do claim an intimacy which gave opportunity for an analysis of his character and personality which rarely comes to one. In the first place, he was one of the most talented men of his time; he possessed a rare grace of literary expression and style; as both writer and teacher he was appreciated and admired wherever he had an audience; a man of force, no company of men of which he was one failed to recognize him as a leader; a devotee of his profession, he sacrificed his time, aye his life, for the promotion of its interests and the advancement of its usefulness.

The work he did in editing *Oral Hygiene*, in lecturing on this subject throughout the country, in fathering the moving picture demonstration, is a matter of history. A man of progress, he hated old forms and had little regard for precedent. The things to be done were to be determined not only by the experience of the past, but by the latest information of the present. He was not afraid to try a new way; in fact, Ed Hunt was not afraid of anything. He never whimpered at any stroke fortune dealt him, but took what came, after he had done his best.

Ed Hunt was a democrat of democrats; he knew no throne at which to kneel, but with those he knew and loved he would almost make obeisance at strange altars—in fact, the one complaint I made to him was that he had too many friends; but then, others got a touch of that which I cared most for—the consideration and love of George Edwin Hunt.

I cannot replace him in my affection, but feel that selfish mourning would be distasteful to him.

"Peace! Come away; the song of woe
Is, after all, an earthly song:
Peace! Come away; we do him wrong
To sing so wildly; let us go."

B. HOLLY SMITH.

Dr. George Edwin Hunt was a native of Indianapolis, and was born on April 29, 1864. His early education was in the public schools of his native city, where he completed the common school course and the first two years

of high school. Entering what is now the DePauw University at Greencastle in 1882, he completed a two-year course in civil engineering, after which he attended the University of Michigan at Ann Arbor for one year. For the following four years he was engaged in railroad engineering work in Florida, after which he entered the Indiana Dental College, being graduated from it in 1890 with the degree of Doctor of Dental Surgery, and subsequently attending the Indiana Medical College, where he received the degree of Doctor of Medicine.

After graduation, Dr. Hunt engaged actively in the practice of dentistry in Indianapolis. Being elected in March 1891 to the board of trustees of the Indiana Dental College, and subsequently to the position of its secretary, he, in 1896, gave up active practice of his profession and devoted his entire time to executive work as an officer of that institution.

Dr. Hunt was a member of the National Dental Association from 1891 until the time of his death, and was vice-president of the organization in 1906 and 1907. He was vice-president of the Fourth International Dental Congress, held in St. Louis, Mo., in 1904. He was a member of the Indiana State Dental Association, serving that association as secretary for seven years, and as president for one year. He became a member of the National Association of Dental Faculties in 1895, and in 1905 was elected to the office of secretary, which position he held until 1913, when he was elected president of the association. He was also president of the Institute of Dental Pedagogics in 1902.

Dr. Hunt, in addition to the above positions of honor, was a prominent member of the Delta Sigma Delta Fraternity, and was the editor of *Desmos*, the official organ of the fraternity, for fourteen years. He was the founder of the *Indiana Dental Journal*, and its editor from 1898 to 1900. In 1911 he became editor-in-chief of *Oral Hygiene*, which position he occupied until his death.

Dr. Hunt's work as an author on subjects of interest to the dental profession is of incalculable value and is well known to his *confrères*. Locally he was a member of several civic organizations, his political efforts being always in the cause of cleaner government. He became affiliated with the Masonic fraternity in 1885, attaining the thirty-second degree of the Ancient and Accepted Scottish Rite, in addition to which he was a member of Murat Temple, Ancient Arabic Order of the Nobles of the Mystic Shrine.

Dr. Hunt is survived by a widow, Maria Foster Hunt, a stepdaughter, Frances Buchanan, and two sisters.

DR. ALTON HOWARD THOMPSON.

DIED, May 13, 1914, at Topeka, Kansas, after long illness, in his sixty-sixth year, ALTON HOWARD THOMPSON, D.D.S.

Alton Howard Thompson was born April 8, 1849, at Logansport, Indiana. His father was Thomas Boal Thompson, and his mother Isabella Adams, who came from Juniata county, Pa. His father was of Scotch-Irish descent and his mother of English ancestry. After the death of his mother in 1852, deceased was taken with a baby sister back to Pennsylvania, and was raised by his mother's people, spending a few years of childhood in Logansport and two years in Dalton, Ga., where his father was in the banking business in 1856–59. While there he lived with Dr. M. H. Banner, who was a dentist of the old school, and who gave him the first suggestion of taking up dentistry as a vocation, which was carried out in later years. The outbreak of the civil war drove Thompson's father North. He married Miss Jennie Boal and settled in Perry county, Pa., near the old home. Young Alton received his education at the country schools and academies, and in Dalton, Ga., he attended an old-fashioned subscription school. But the war so affected the family fortunes that he was unable to go to college, to his lifelong regret.

In 1866 he went to study dentistry with a Dr. G. L. Derr in Mifflintown, county seat of Juniata county, Pa., remaining for a year. Afterward he practiced in Millerstown, Perry county, Pa., and made an itinerary of other small towns. Failing in this, he went to Logansport in 1869, and after clerking there a few months drifted to Topeka, Kansas. Here he opened an office and practiced a while, and then attended lectures at the Philadelphia Dental College, being graduated as D.D.S. in 1872. Returning to Topeka, he continued his practice there until ill health caused his retirement four years ago.

In 1875 he married Miss Fannie Geiger, who died in 1903, and by whom he had two children, a daughter, Isabel, who died in 1897, aged seventeen, and a son, Wallace, now in Mexico City, employed on the *Mexican Herald*. He was married again in 1906 to Miss Helen Moon, of Topeka, Kansas.

In 1880, deceased assisted in founding the Kansas City Dental College, and had been identified with it almost continuously ever since as professor of "odontography, human and comparative." In the winter of 1899–1900 he went to Philadelphia, and was connected with the Philadelphia Dental College for the session, teaching comparative anatomy, but returned home in the spring. He gave courses at various times on his special study of comparative dental anatomy at the Northwestern University dental department, Chicago, the dental department of the University of Tennessee at Nashville, the Marion-Sims Dental College at St. Louis, and the Angle School of Orthodontia at St. Louis for several years.

He was a prolific writer for the dental journals, and essayist before various dental societies, mainly on topics relating to his specialty of comparative dental anatomy, on which subject he wrote a text-book, "Comparative Dental Anatomy," for dental students, which was published in 1899. This book has been recently revised by Dr. Martin Dewey and republished. Following this with his other hobbies, archeology and anthropology, he carried forward his comparative study of the teeth to the different races of mankind, and made some extensive investigations on the Peruvians, Mexicans, and Mound-builders. He made a collection of skulls of Indians, Pueblos, and Mexican races, and their potteries, and also of archeological specimens. He was much interested in comparative studies as related to the advancement of the scientific side of dentistry, especially in connection with anthropology, so important as a fundamental science. His writings in the fields of natural science, anthropolgy, archeology, evolution, and odontology were very numerous and important.

Deceased was a member of the Presbyterian Church and a republican in politics, but never held a political office. He joined the Kansas State Dental Association in 1872 at the first meeting after its organization in 1871, and was elected secretary; he also served as its president (1875–76) and this honor was conferred on him a second time (1881–82).

He was a member of the old American Medical Association, the Missouri State Dental Association, which he joined June 5, 1872, the St. Louis Society of Dental Science, the Kansas City Odontographics, and other dental societies. He was a fellow of the American Association for the Advancement of Science, was one of the founders and a member of the American Anthropological Association, and a member of the American Ethnological Society and the American Folk Lore Society. He was a member of the section of Dental and Oral Surgery of the Ninth International Medical Congress, the Columbian Dental Congress, was vice-president of the Fourth International Dental Congress at St. Louis, and honorary president of the Shawnee County (Kansas) Dental Society.

In appreciation of Dr. Thompson's scientific achievements and his personality, we may aptly cite the words of a close personal friend, Dr. C. B. Reed of Topeka:

"Fortunately the value of one's career is measured by what he has contributed to the betterment of society, achieved for home and humanity, rather than by the number of days he has lived. Applying this test, then, all will agree that Dr. Thompson's was a well-rounded life.

"We will not attempt to do justice to his genius, but it is a privilege to pay homage to his memory, realizing, as we do, that when that 'mysterious agency, called Death, touched his brow with its relentless fingers,' not only did the dental profession, to which he had contributed so much, lose a highly gifted and loyal member, but the field of sociology, also, was deprived of one of its most aggressive and valued supporters.

"He had achieved signal success as an educator—his literary attainments will long be remembered, and his resourcefulness as an investigator will occupy a conspicuous place in history; yet, long after the luster of these splendid attributes may have grown dim, there will still remain bright the most gratifying and stimulating thought of all—that of dwelling upon the memory of his gracious consideration of personal friends, associates, and neighbors; this will ever be kept green and fragrant with gratitude and affection.

"Dr. Thompson not only knew how to make

friends and keep them, but he possessed that rare trait of keeping friends with himself. He was a stalwart in his adherence to the principles of righteousness, and though his work is ended, it was well performed, and he has gone to that reward which waits on true faith, high endeavor, and duty done."

Brief Necrology.

Dr. J. M. Fischer of Waukegan, Ill., on July 19, 1914, from drowning.

Dr. Martin B. Smiley of Lewiston, Me., on June 16, 1914, of apoplexy, in his seventy-second year.

Dr. George W. Coder of Philadelphia, Pa., of pneumonia. Deceased was a graduate of the Philadelphia College of Dentistry.

Dr. Wm. E. Lindstedt of Greenwich, Conn., on June 17, 1914, in his sixtieth year. Deceased was a graduate of the New York College of Dentistry.

Dr. F. J. Richards of Williamsport, Pa., of pneumonia, in his seventy-second year. Deceased was a member of the Williamsport Dental Society.

Dr. Emmet T. H. Leonard of Jackson, Miss., on June 7, 1914, of tuberculosis. Deceased was a graduate of the Baltimore College of Dental Surgery.

Dr. Ross A. Pritchett of Whitehall, Ill., on July 15, 1914, of tuberculosis, in his thirty-ninth year. Deceased was a graduate of the Northwestern University Dental School.

Dr. James A. Lindsay of Sacramento, Cal., on July 12, 1914, of typhoid fever, in his thirty-fifth year. Deceased was a graduate of the College of Dentistry, University of California.

Dr. Albert B. Clark of Honolulu, Hawaiian Islands, on June 30, 1914, of diabetes, in his seventy-first year. Deceased was apprenticed to Dr. I. A. Freeman of Chicago, in which city he practiced until 1900. He was a member of the Chicago Dental Society and the Illinois State Dental Society.

Dental College Commencements.

UNIVERSITY OF MICHIGAN, COLLEGE OF DENTAL SURGERY.

The annual commencement exercises of University of Michigan, College of Dental Surgery, were held in Ann Arbor, Mich., on June 25, 1914.

An address was delivered by Edmund Janes James, LL.D., president of the University of Illinois.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Leo E. Baribeau	Rufus C. Field	Frank P. McCarthy	Elbert C. Ryle
Frank Benham	Edward J. Green	Oscar Manthey	Ewonda B. Schlencker
Levon G. Beshgetoor	James M. Gregory	Charles V. Manville	Court C. Schwartzbek
David J. Bort	Warren E. Guerrier	Paul E. Meyer	John A. Scofield
Charles H. Brady	Edwin S. Hanna	Roderick C. Morrison	John G. Shaffer
Don C. Broadbridge	Earl V. Harrington	Joseph A. Motley	Marion M. Sheaffer
James A. Calby	Paul C. Hohl	Frank J. Mulcahy	Cecil M. Sigler
Bernice E. Champe	Foster McL. Holmes	Floyd E. Nichols	Ernest R. Smith
Frederick C. Daniels	Fletcher R. Jackson	Patrick H. O'Leary	Burr E. Stevens
Minnie L. Davis	Timothy P. Jamison	Charles L. Pickell	John R. Teifer
Abram F. De Heer	Breyton D. Jones	Harold Pilgrim	Clarence N. Vyn
Ralph P. Dendel	Clifford McC. Jones	Ernest L. Pilkington	Clair U. Walker
Albert H. Dredge	Florenz A. Klopfer	Lewis E. Read	Horton R. Warren
John Drozkowski, Jr.	Norbert D. Kulasavicz	Charles A. Rice	Benjamin D. Welling
Aaron F. Eidemiller	Ralph E. Lambert	Milburn E. Rice	Loy A. Weston
Albert W. Farley	Rollo Lown	Don F. Roedel	Gordon E. Wittet

WESTERN RESERVE UNIVERSITY, DENTAL DEPARTMENT.

THE annual commencement exercises of the Western Reserve University, Dental Department, were held on June 18, 1914, in Cleveland, Ohio.

An address was delivered by Chas. S. Whitman, district attorney of New York, N. Y.

The degree of Doctor of Dental Surgery was conferred by President Chas. F. Thwing on the following graduates:

Arthur R. Agate
Robert M. Allen
James I. Allen
John Belford
Louis I. Bergman
Ralph O. Bower
Michael D. Castrigano
Hugh D. Conlon
Ivan E. Downey
Paul W. Eggert
Edward M. Feiman
James V. Gentilly
George Geroff
Joseph H. Goodman
Edward W. Graebner
Frank G. Greer
Charles Hoffman
Charles W. Hudson
Emil L. Kihorany
Clarence P. Landgrebe
John J. Leahy
Casper A. Licht
Charles J. Lowe
John Majoros
Charles J. Milling
James W. Moats
Pierce H. Mullally
Fred A. Newhall
Peter E. Nowak
Carl P. Orth
James P. Patterson
Robert L. Prendergast
Arnold A. Read
Edward W. Roth
George W. Sandberg
George A. Shilling
Francis D. Singleton
Clarence T. Story
Joseph E. Uhlir
Harrison B. Wall
Thaddeus H. P. Warren
W. Howard Williams
John H. Woods
Wilbur W. York

NORTHWESTERN UNIVERSITY SCHOOL.

AT the annual 1914 commencement exercises of Northwestern University Dental School, held in Chicago, Ill., the degree of Doctor of Dental Surgery was conferred on the following graduates:

Clare A. Alcorn
Ross A. Anderson
Victor Anderson
Ross A. Armour
George M. Babbitt
Gordon C. Barkley
Ray E. Bechtel
Everett C. Bernhisel
John M. Bernhisel, Jr.
Robert E. Blackwell
Roy O. Brandt
Elkanah M. Buchner
Horace C. Buttery
John J. Bybee
Rollo M. Chappell
Patrick D. Chisolm
Edward W. Chrisman
Thomas S. Christensen
Paul W. Clopper
Alexander Colletti
John J. Collins
Ludovic J. J. Cools
Jesse J. Corlew
Mefford J. Couch
Milton Cruse
Paul V. Crosthwait
Vernon E. Cultra
D. English Curry
Franklin C. Dallimore
Frank B. Daugherty
Max P. Daunhauer
Oakley B. Davy
Jelke V. DeBoer
James H. Dickey
Edward R. Doering
William F. Dravel
Tenny Dybing
William R. Eberle
Jenkin Ellsworth
Raymond A. Evans
Clyde D. Ewing
Clinton O. Fillinger
William F. Foss
Joseph E. Frankel
Charles L. Fraser
Henry L. Freeland
Earl D. Fritsch
Ira Funkhouser
John C. Gallagher
Lawrence W. Gange
Carl A. T. Gasslander
Harris T. Green, Jr.
Robert J. Hamilton
Harris G. Hanson
William C. Harper
Ralph B. Harpham
Jasper E. Harris
Andrew Haugen
Meredith E. Helm
Amos C. Hemsworth
Henry D. Hipsh
Frederick J. Hirn
Harvey F. Hollister
William G. Hopper
Raymond W. Horlick
William W. Horn
Charles M. Hurley
Arthur E. Hurt
John J. Ingle, Jr.
Charles G. Irons
Clarence P. Jackson
William F. Jamison
Alfred Jaster
Harold B. Jensen
Robert H. Jirka
Henry E. Johnson
Martin O. Juel
Leo Henry Jung
Chujiro Kato
Seiji Kato
John B. Kennedy
Norman L. Kettlewell
Benjamin H. King
Albert H. Knaak
Alfred H. Kratky
Leo W. Kremer
George L. Kroshus
Nicholas E. Kuehn
Asa J. LaGrow
Lulu I. Lane
Haidee W. Latham
Marie L. Lehmann
William J. Lewis
Julius P. Lipsky
Edel Lomholt
Milo B. Loomis
Alves E. McKnight, Jr.
James C. Martin
Harry D. Menges
Benjamin S. Merwin
Earl S. Metcalfe
Anna L. Miller
John H. Mitchell
Conrad E. Mortensen
Levon B. Mughalian
Martin W. Murray
Arthur H. Nolan
Guy R. Oden
Caleb J. Olson
Henry J. Ordon
Harold W. Page
George F. Pankonin
Rue P. Parcells
Laurence W. Park
Theodore P. Pett
Theodore W. Prail
Victor B. Rea
William D. Reeve
Will J. Rennie
Joseph E. Ridgway
George A. Rivard
Clarence G. Rorer
Ross S. Rose
John S. Ross
Robert M. Russell
Edward Satek
William H. Saeger, Jr.
Ernest A. Schniedwind
Ralph A. Sears
Roy B. Slack
Harry A. Smith
Oscar C. Soellner
Edward Soucek
Charles J. Stanton
Chester T. Steffy
Vernon F. Stephens
Lester E. Steward
Frank B. Stubbert
Edmund F. Sullivan
Leo A. Templeton
Charles R. Terry
Graydon M. Terry
Newton G. Thomas
John R. Thometz
Svein Vinje
Harry B. Weiler
Olaf K. Westling
Thomas White
Aubrey T. Williams
Lellen A. Wills
Roy M. Wilson
William H. Wodrich
Erving F. Wollin
George W. Young
Charles F. Zak
Lorenz H. Ziegler
Louis A. Ziemke
John A. Zwisler

UNIVERSITY OF IOWA, COLLEGE OF DENTISTRY.

The thirty-second annual commencement exercises of the State University of Iowa, College of Dentistry, were held in Iowa City, Iowa, on Wednesday, June 17, 1914.

The commencement address was delivered by Hon. Alexander MacDonald, LL.D., Toronto, Can.

The degree of Doctor of Dental Surgery was conferred on the following graduates:

Paul M. Anderson	Minnesota
Raymond J. Andrews	Washington
Don L. Bare	Iowa
Wm. J. Barry	Iowa
Joseph D. Bellamy	Nebraska
Ray V. Brandt	Wisconsin
Craig W. Casaday	Iowa
Leeland V. Cockrum	Missouri
Frank M. Crawford	Iowa
Donald L. Crissinger	Iowa
Paul J. Curry	Iowa
Leo R. Daley	Iowa
Geo. J. Denzler	Nebraska
Leo G. Dick	Iowa
Harry E. Duwe	Iowa
John M. Eason	Iowa
Joseph C. Esser	Minnesota
Wm. F. Ettinger	Iowa
Nobuji Fukushima	Japan
Tjode C. Grothaus	Iowa
Oliver A. Haberdier	California
Earl W. Howard	Iowa
Chas. F. Huber	Iowa
Glenn H. Humphrey	Iowa
Samuel A. Katz	Iowa
Oliver A. Langland	Iowa
Egidio A. Laraia	California
Carlton C. Lawhead	Missouri
Ralph C. Long	Iowa
Hiram W. Loucks	Iowa
Martin A. McDevitt	Iowa
Robert L. Morse	Iowa
Joseph C. Murphy	Iowa
Peter W. Qually	Iowa
Ray W. Rogers	Iowa
Clifford A. Ross	Montana
John Scholton	Iowa
J. Ross Simpson	Iowa
Roy C. Siple	Iowa
Earle S. Smith	Iowa
Ray M. Smith	Minnesota
V. Ray Smith	Minnesota
Elmer R. Swank	Iowa
Raymond D. Temple	Iowa
Joseph C. Tymony	Missouri
Alvin D. Ward	Iowa
Lawrence M. Wise	Iowa
David A. Wittrig	Iowa
G. H. O. Wormhoudt	Iowa

SOCIETY NOTES AND ANNOUNCEMENTS.

International Exhibition, Lyons, 1914.

ORAL AND DENTAL HYGIENE CONGRESS.

Lyons, France, September 24–28, 1914.

Dear Colleague,—Inasmuch as hygiene in general is rapidly growing in public recognition, it has been deemed most desirable that a Congress of Oral and Dental Hygiene shall form a constituent part of the general Hygiene Congress which is to be held in Lyons during the International Exhibition to take place there in September.

Preparations for this congress are being made under most favorable auspices. The most distinguished scientists are giving it their patronage, and its synchronizing with the great Exhibition organized by the city of Lyons greatly enhances the assurance of success both for the meeting in general and for the special section devoted to the consideration of the oral and dental phases of hygiene.

We desire to appeal to all workers in the field of diseases of the mouth and teeth, believing that—laying aside subjects of professional disputation—we can heartily meet and harmoniously exchange ideas on the subject of oral hygiene, with most profitable results to ourselves and our patients.

The congress will include active members and associate members (members' relatives). Dues have been fixed at 15 fr. for active members and 5 fr. for associates.

Members will be entitled to many privileges.

The Transactions, with papers and discussions, will be forwarded to them free of charge. The Committee of Organization is preparing official receptions and festivities and arranging for excursions. A Ladies' Committee will cordially receive our *confrères'* wives and will endeavor to make their stay in Lyons as pleasant as possible.

It is unnecessary to enlarge upon the opportunity presented by this occasion from the professional standpoint. The undersigned, in the name of the Committee of Organization, solicit your enrollment as an active member, and request that you forward your application at your earliest possible convenience, also the title of any paper which you may have to present to the congress, to the general secretary, Dr. J. Vichot, 6 rue de la Barre, Lyons.

With fraternal greetings,

A. Pont, *President*,
J. Vichot, *Gen. Sec'y.*

AMERICAN MILLER MEMORIAL.

To the Dental Profession of America:

The committee appointed by the Ohio State Dental Society at the 1909 meeting for the purpose of raising funds for an American Memorial to the late Dr. W. D. Miller desire to make the following report:

Funds have been received from the following states: Alabama \$25.00, Arizona \$25.00, Arkansas \$50.00, California \$60.00, Colorado \$82.00, Connecticut \$50.00, Georgia \$60.00, Illinois \$531.00, Iowa \$200.00, Indiana \$75.00, Kansas \$134.50, Kentucky \$105.00, Maine \$25.00, Massachusetts \$100.00, Michigan \$300.00, Minnesota \$100.00, Missouri \$100.00, Montana \$15.00, Nebraska \$100.00, New Hampshire \$25.00, New Mexico \$25.00, New York \$125.00, Ohio \$1303.00, South Carolina \$25.00, North Dakota \$50.00, South Dakota \$15.00, Oklahoma \$31.00, Oregon \$50.00, Pennsylvania \$20.00, Tennessee \$50.00, West Virginia \$25.00, Washington \$50.00, Wisconsin \$25.00, Wyoming \$10.00, Texas \$50.00, Utah \$14.00, Vermont \$20.00, Virginia \$50.00. Total \$4300.50; interest on this fund to December 1, 1913, amounts to \$382.94, making a total in the hands of the treasurer, Dr. Weston A. Price, of \$4683.44. Florida and Mississippi have each voted \$50.00, but the amounts are not in the treasurer's hands at this date.

The memorial will consist of an 8-foot bronze statue of Dr. Miller mounted on a 7-foot granite pedestal, to be placed on the lawn of the public library, the most appropriate site in the city of Columbus, the capital of Dr. Miller's native state. Suitable tablets will be prepared, and it is the desire of the committee to state on one of them that the monument is erected by funds from every state in the Union. If your state is not represented in the above list, we want your co-operation in placing it there.

It is hoped that sufficient funds—\$5500.00—will be in the treasury that steps can be taken at once toward the construction of this memorial, so that it may be finished and ready for unveiling at the 1915 meeting, which will be the fiftieth anniversary, of the Ohio State Society. The valuable co-operation of the honorary committees in the several states is hereby acknowledged; they have made this memorial a reality.

Other professions have done honor to their distinguished dead; let us do the same for Dr. Miller, whose life was one of unselfish devotion to the scientific advancement of dentistry.

Yours very truly,
Edward C. Mills, *Chairman*,
J. R. Callahan,
S. D. Ruggles,
Committee.

Columbus, Ohio, April 7, 1914.

NATIONAL MOUTH HYGIENE ASSOCIATION.

A series of illustrated lectures on Mouth Hygiene is being prepared by this association for rental service. The first lecture of the series, a talk suitable for a mixed adult audience or school pupils above the age of twelve years (designated as lecture "A") is now ready. The lecture set (manuscript and 36 slides) will be furnished to members of state dental societies and others who may be considered as competent to present the matter to the public, at a fee of One Dollar per use.

For further particulars and application blanks, address the Director of Extension Lectures,

Edwin M. Kent, D.M.D.,
222 Washington st., Brookline, Mass.

DENTISTS' MUTUAL PROTECTIVE ALLIANCE.

We have received for publication the following notice:

Dentists' Mutual Protective Alliance.

The recent decision by Judge Kenesaw Landis, in the Northern district of Illinois, denying the motion of attorneys for Taggart for a preliminary injunction against the officers and members of the Dentists' Mutual Protective Alliance, marks the first skirmish in a new battle. The above is an organization recently formed in the state of Illinois for the purpose of testing the validity of all process patents relating to dentistry, and, though only four weeks old, it boasts a membership of over four hundred.

Those who follow the progress of the Taggart process litigation will recall that in the Taggart vs. Boynton case the District court of appeals in Washington decided unanimously against the validity of the patent. However, in the case of Taggart vs. Moll, Judge Landis, of the Ninth federal district, decided in favor of Taggart, thereby re-establishing the validity of the patent. In the face of these two conflicting decisions there is much speculation as to the results, and the case will therefore be watched with keen interest by all members of the profession.

Dr. J. Clinton Grant, *Cor. Sec'y.*

Dentists' Mutual Protective Alliance,
1118 Republic Bldg., Chicago, Ill.

STATE UNIVERSITY OF IOWA ALUMNI ASSOCIATION.

The next meeting of the Alumni Association of the Dental College of the State University of Iowa will be held at Iowa City, during the home-coming week, on Thursday, October 22, Friday, October 23, and Saturday morning, October 24, 1914. The Iowa-Minnesota football game will be played on Saturday afternoon, October 24th.

The entire meeting will be devoted to prosthodontia. The officers take pleasure in announcing that they have secured the services of Dr. G. H. Wilson of Cleveland, Ohio, author of the most modern and thorough work on dental prosthetics, and Dr Forrest H. Orton of St. Paul, Minn., professor of crown and bridge work at the Dental College of the State University of Minnesota.

Dr. George H. Wilson will lecture and demonstrate on anatomical occlusion, its underlying principles, elucidating and comparing modern methods; also the retention of artificial dentures, discussing the different principles and demonstrating the different methods. Dr. F. H. Orton will give a lecture and clinic on crown and bridge work.

Names of other prominent prosthodontists who will contribute to this meeting will be announced later.

Richard Summa, *President*,
John Voss, *Sec'y.*

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. Harvey Blain, *Sec'y*,
Prescott, Ariz.

WYOMING BOARD OF EXAMINERS.

The Wyoming State Board of Dental Examiners will meet at Cheyenne, Wyo., in the Senate chamber, on September 1, 2, and 3, 1914.

The written examination consists of anatomy, physiology, histology and bacteriology, chemistry and metallurgy, oral surgery, anesthetics, operative and prosthetic dentistry, materia medica and therapeutics, prophylactics, and orthodontia. Applicants must present a full plaster model of upper and lower jaws with teeth, also one without teeth. Practical work will be required from all candidates taking the examination. The candidate is required to furnish his own operating instruments, dental engine, amalgam, gold, wax, and modeling compound.

For further information and application blanks, address

Peter Appel, Jr., *Sec'y*,
P. O. Box 643, Cheyenne, Wyo.

RHODE ISLAND BOARD OF REGISTRATION.

The next meeting of the Rhode Island State Board of Registration in Dentistry for the examination of candidates will take place at the State-house, Providence, R. I., on Wednesday, Thursday, and Friday, October 7, 8, and 9, 1914.

Wm. B. Rogers, *Sec'y*,
171 Westminster st., Providence, R. I.

INDIANA BOARD OF EXAMINERS.

The next meeting of the Indiana State Board of Dental Examiners will be held at the State-house, Indianapolis, commencing Monday, November 16, 1914, and continuing five days. For application blank and full particulars address

Dr. Fred J. Prow, *Sec.*,
Bloomington, Indiana.

CONNECTICUT DENTAL COMMISSION.

The Connecticut State Dental Commission hereby gives notice that it will meet at Hartford, November 19, 20, and 21, 1914, to examine applicants for license to practice dentistry in the state, and to transact any other business proper to come before it.

Application blanks, copies of the revised requirements, rules, etc., will be mailed by the Recorder upon request.

Edward Eberle, *Recorder*,
902 Main st., Hartford, Conn.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY 1914.

July 7.

No. 1,102,373, to George L. Wernet and Henry A. Collet. Artificial tooth.

No. 1,102,390, to Van Broadus Dalton. Dental orthodontia model.

No. 1,102,401, to Frederick O. Gamble. Dental floss holder.

No. 1,102,741, to Robert Hardie. Dental articulator.

No. 1,102,753, to James W. Ivory. Device for shaping dental wooden sticks.

No. 1,102,850, to Thomas R. Arden. Dental crown-post extractor.

July 14.

No. 1,103,088, to Heinrich Schweitzer. Dental pattern wax.

No. 1,103,515, to Sylvester B. Husch and George S. Husch. Tooth-brush.

No. 1,103.606, to Christoph F. Montag. Orthodontia pliers.

No. 1,103,879, to Edward F. Hoffman. Tooth-brush.

July 21.

No. 1,104,290, to Merrill S. Charles. Removable attachment for compensating mal-articulation of teeth.

No. 1,104,459, to David Weiss. Tooth-brush.

No. 1,104,662, to Garrett L. Grier. Sanitary dental impression tray.

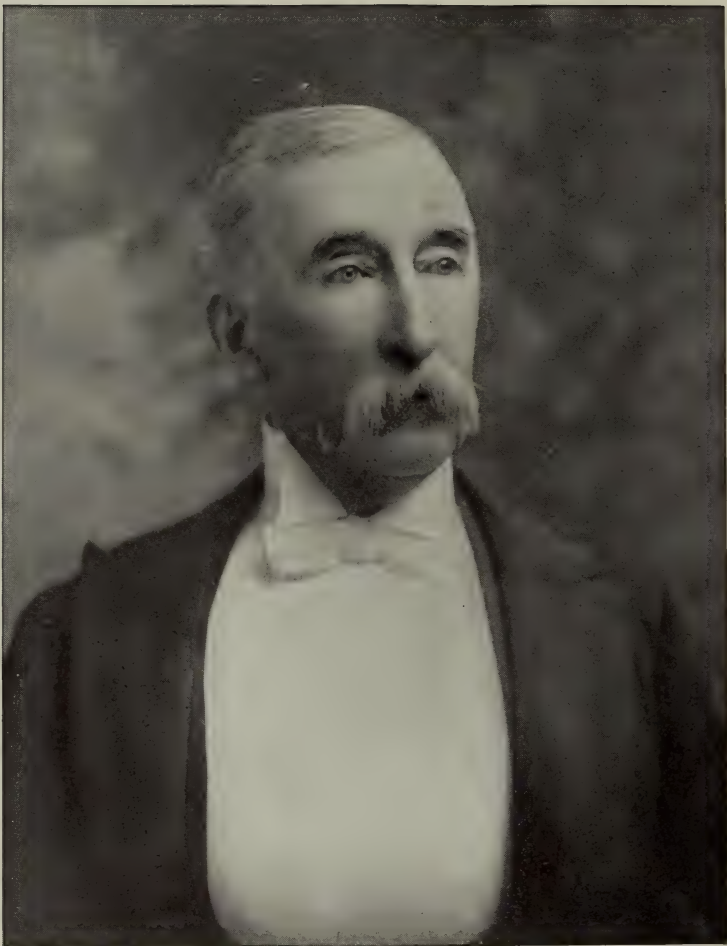
July 28.

No. 1,105,005, to Raphael A. Sonn. Floss toothpick.

No. 1,105,425, to Harry V. Hart. Dental casting apparatus.

No. 1,105,456, to Walter F. Richards. Dental lathe-file.

No. 1,105,476, to Robert M. Withycombe. Artificial tooth.



DR. M. WHILLDEN FOSTER.

THE

DENTAL COSMOS.

VOL. LVI. OCTOBER 1914. No. 10.

ORIGINAL COMMUNICATIONS.

THE SELECTION OF FILLING MATERIALS FOR THE DIFFERENT CLASSES OF CAVITIES.

By C. N. JOHNSON, M.A., L.D.S., D.D.S., Chicago, Ill.

(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 14, 1914.)

MUCH as this subject has been written upon, there seems yet to be the necessity for a really definite statement or rather a restatement of the principles involved in the selection of filling materials for different cases. Back of all operative procedures there should be the well-formulated and definite aim of the operator to make such an operation as will most surely serve the best interests of his patient, and not until he has studied carefully the behavior of fillings under varying conditions is he able to select promptly and with assurance the material for a given case which will promise the best service.

It seems to be the tendency of many operators—in fact it is the tendency of humanity in general—to get into ruts, and follow any tangent which leads them along the lines of least resistance. The dentist above all men should guard against this tendency. Too frequently a certain method of procedure appeals to a practitioner, and he follows that method blindly in all cases, regardless of the fact that other methods might serve a better purpose in given instances. A close study of the behavior of filling materials in different classes of cavities is necessary before an operator can determine what is the proper material to be used in all cases, and it is with the hope of aiding in this study that the following suggestions are made. The difficulty of laying down definite rules of practice in this particular is enhanced by the varying conditions which are presented to the operator in his daily work. These conditions must be reckoned with, and it is often a matter of nice judgment to decide what material shall be used; as Dr. F. W. Gethro has succinctly remarked, "There is no best filling material except for the case in hand." And yet there are certain physical properties possessed by one material which are absent in another, and which may prove a prominent factor in determining its availability or unfitness for certain

classes of cavities, and it is with this idea in mind that the present paper is presented.

CAVITIES IN THE PROXIMAL SURFACES OF INCISORS AND CUSPIDS.

These are the cavities which of all others present the most difficult problem for the dentist to solve. It is not that they are more complicated than some others as far as saving the teeth is concerned. This can be done perfectly with gold foil or, in some instances where the incisal angle is gone, with gold inlays. But in most mouths the teeth are exposed to view in conversation, and the display of gold is objectionable. No matter how much we may assert that the prime object of filling teeth is to stop caries and save the teeth, the esthetic taste of our modern civilization forces upon us another consideration, which we, as a cultured profession, should foster and not combat—*i.e.* the offense imposed upon our higher sensibilities by a display of our dental operations to the eyes of the world. All evidence of our operative interference should therefore be as completely disguised from public view as our ingenuity can enable us to do this, and in this view of the case, gold is often contraindicated on account of its color and lack of translucency. It is undeniable that gold is conspicuous in many mouths in anterior teeth, and if we are to live up to the highest possibilities of esthetic dentistry, we must discard it in these cases. But let it be said in passing that in every instance where gold can be used without being exposed to view, it should be employed as the most certain means at our command for the saving of teeth.

When gold cannot be used, our choice necessarily falls chiefly upon two materials. Gutta-percha is sometimes suggested, but its field is so limited, except for temporary work, that it need not be considered in the present discussion. Our attention, then, must be directed to porcelain and the silicate cements. The fact may as well be recognized and faced at once that neither material will guarantee the same degree of permanence as gold. I am almost tempted to say that both porcelain and the silicates are merely temporary makeshifts, and yet this would seem to be a rather harsh term to apply to materials which have shown instances of good service for many years, and which give promise of as many years to come. But these instances are not sufficiently numerous to entitle these materials to the reputation of being reliably permanent. Of the two, there can be no question that porcelain will last longer than will the silicates in their present stage of development, though it is confidently hoped that the latter will be improved so as to eventually be much more serviceable than they are today. Then they will be preferable to porcelain in one important particular. The margins of porcelain inlays after some years of service are frequently found to be in a very unsatisfactory condition owing to a chipping of the material, or to a staining of the line between the inlay and the tooth. Either of these defects leaves the inlay unsightly. So far as appearance is concerned, the silicates are a distinct improvement over porcelain, and even with their present limitations there are many indications for their use. But they are not sufficiently strong to be relied on for contour work or for fillings in any position where stress is to be applied upon them.

Looking at these two materials with their present physical manifestations, we may follow the general rule that, whereever they are called for, the smaller the cavity the greater the indication for silicate, and the larger the greater the indication for porcelain. We all know the extreme difficulty of obtaining perfect technical results in very small cavities with porcelain, while the lessened area for a wearing surface would minimize the danger of abrasion of silicate cement. In large cavities this exposure to wear becomes a serious menace to the life of silicate fillings, while aside from its friability, porcelain has perfect wearing properties. In contour restorations, where the incisal angle is gone, the silicates have proved very unsatisfactory,

while with porcelain these angles have been restored with an encouraging record of service apart from the conditions of the margins already alluded to. At best, we have no material which perfectly meets these cases, and every observing practitioner must look forward with anticipation to an improvement in this respect. The only thing we can do today is to limp along with the materials we have at our command, which is not a very flattering commentary on our prestige as a profession.

A somewhat encouraging solution of this problem may be secured in some instances by a combination of the gold inlay with the silicate cements. When the incisal angle has been destroyed a gold inlay may be made, but before casting this inlay, the labial surface is carved in wax to leave a cavity which, after the inlay is cemented, may be filled with silicate cement of the proper shade. Thus the gold is placed where it will receive the stress, and the silicate where it is exposed to view. This will serve a good purpose in certain cases, but it will not meet all exigencies, and leaves us yet with the necessity of a new filling material for anterior teeth.

CAVITIES IN THE GINGIVAL THIRD OF THE LABIAL SURFACES OF INCISORS AND CUSPIDS.

This class of cases is much more readily controlled. In many instances these cavities are out of view, even when the incisal tips of the teeth are exposed, and in every such case gold, either in the form of foil or of inlays, is clearly indicated. There is no longer any possibility of argument against the fact that gold is the most permanent filling we can use in these cases. A careful observation extending over many years has proved this beyond a shadow of doubt, and no amount of argument can disprove what has so clearly been demonstrated by experience. As to choice between gold foil and gold inlays, this must be determined solely on the basis of technique. If a perfect technique can be obtained with gold foil, this is the filling *par excellence* to use. Nothing in all the alchemy of nature has yet been found which will so perfectly protect a tooth against further decay as a pure gold foil filling when it can be made technically perfect. But this cannot always be done in these cavities without too great discomfort to the patient, and when such is the case, gold inlays should be used. This is particularly true if the cavity extends far under the free margin of the gum, and the application of the rubber dam would not only prove painful but might result in such injury as to cause a subsequent recession of the gum. Generally speaking, the smaller or narrower the cavity, the greater the indication for gold foil, and *vice versa.*

When these cavities are exposed to view, the choice must be, as with exposed proximal cavities, between porcelain and the silicates, and the selection should be governed by the same general considerations as have already been mentioned. Probably the silicates have a wider range of usefulness here than elsewhere on account of the better appearance of their margins in these prominently exposed surfaces, but in passing, a word of caution must be said with reference to cavity preparation. The sensitiveness of these teeth at this point, and the fact that little stress is to be brought to bear on the filling, tempts operators too frequently to make shallow cavities with little or no mechanical retention. This is particularly true if inlays or silicate cements are to be used, and as a consequence many of these inlays and fillings have been lost through no intrinsic fault of the material itself. Good mechanical anchorage should be provided not only for inlays, but for silicate fillings, one of the chief limitations of the latter materials being that they do not cling so tenaciously to the dentin or enamel as do the oxyphosphates.

CAVITIES INVOLVING THE INCISAL EDGE OF INCISORS AND CUSPIDS.

If these cavities are situated merely lingually of the labial plate of enamel, and do not involve that plate, they are

best protected with gold foil or platinum-gold, but if the entire incisal end of the tooth is involved, so that the labial plate must be lengthened and the filling exposed to view and to attrition, gold or porcelain inlays are indicated. With gold the esthetic feature is sacrificed, and with porcelain there is never any assurance of long-continued service, though it is true that when the stress of attrition is brought to bear squarely against the inlay, porcelain has been known to last a long time. Were it not for appearance and for the long-drawn-out nature of the operation, the very best material for these incisal restorations is platinum-gold. No other kind of protection can be given such teeth which will so serviceably answer the purpose as this material, but its color and exacting technique limit its use.

CAVITIES INVOLVING THE PROXIMAL AND OCCLUSAL SURFACES OF BICUSPIDS AND MOLARS.

It is in the management of these cases that probably the greatest change has been made in the last ten years. Previously thereto, the majority of these cavities were filled with gold foil or amalgam, but since the advent of the inlay, particularly the cast gold inlay, a very general stampede has ensued toward that method. The discussion as to the relative merits of gold foil or inlays in these cases seems to have nearly subsided, and as a matter of fact it might as well subside entirely, because in the face of all our discussions over this matter, our patients have taken the decision largely into their own hands, and have alined themselves almost as a solid phalanx on the side of the inlay. We may indulge in long and learned discussions as to the virtue of gold foil, but when it comes to undergoing the discomforts of the rubber dam and having a large gold foil filling in a bicuspid or molar malleted, trimmed, and polished in the mouth, the entire operation requiring an hour or an hour and a half, and comparing this kind of a session with the relative ease of having an inlay inserted, there is no kind of argument that will impress the patient sufficiently to gain his consent to have a gold foil filling inserted. We may as well face the situation as it is, particularly in view of the fact that gold inlays, when well inserted in these cavities, give promise of most excellent service. It is safe to say that since inlays have been used so extensively the interproximal spaces and contact points are preserved in a more normal condition than when foil fillings were inserted in these same cavities, and this of itself is a very important consideration.

The use of amalgam may also be said to have declined since the advent of the inlay, and this is a distinct gain—not that amalgam should be looked upon as an inferior material, but because there can be no question that the use of gold inlays tends to produce a higher class of service than the use of amalgam. Never in the realm of dentistry has a more radical change been made than by the general introduction of the gold inlay into practice, and this change will mean much for the future preservation of the natural teeth if the profession does its full duty by the inlay.

CAVITIES IN THE OCCLUSAL SURFACES OF BICUSPIDS AND MOLARS.

These cavities are usually started in the pits and fissures left by developmental defects in the teeth. They are not the same class of cavities as those which form in smooth surfaces where the enamel is good, and their management is somewhat different. If gold inlays are largely indicated over gold foil for proximo-occlusal surfaces, the converse is true of simple cavities in occlusal surfaces. In these cases, gold foil will serve a much better purpose than inlays, and the exactions in inserting it are not so great as with proximo-occlusal fillings. In fact many of these occlusal fillings may be inserted without the rubber dam, and the aggregate of time employed is much less than that necessitated in the construction of an inlay. Moreover, as has been previously remarked,

there is no other protection for a cavity so perfectly reliable as gold foil when properly inserted, and in these instances it is possible to get a perfect technique with little tax on the operator or patient. In cases where caries has merely followed the fissures or is located only in the pits, it is useless to cut away sound tissue to widen the cavities sufficiently to make inlays practicable. Inlays do not lend themselves readily to small or narrow cavities, and the operation is less exacting and the results are more certain with foil in such cases. In fact, in many instances a good foil filling may be inserted in the length of time required for finishing the wax model of an inlay, and this is particularly true of deep and narrow cavities following fissures, which can very quickly and serviceably be filled with non-cohesive foil, sealing the cavity so as to protect it perfectly against recurring decay. In cavities presenting any appreciable area to the attrition of mastication, the non-cohesive gold should be covered with cohesive to provide a better wearing surface, and in some very extensive occlusal cavities, where much tissue has been lost and when the patient is so difficult to control as to jeopard the probability of a perfect foil filling, the insertion of a gold inlay may be found more serviceable.

In some of the small pit cavities in young patients, a combination of tin and gold will serve an excellent purpose, and this material can be inserted more rapidly than gold alone. In fact, after its manipulation is mastered, it may be inserted in these cases more easily than amalgam, and its length of service is greater, many of these fillings having been under observation for fifteen or twenty years.

CAVITIES IN THE GINGIVAL THIRD OF THE BUCCAL OR LINGUAL SURFACES OF BICUSPIDS AND MOLARS.

In these cases, the judicious use of gold inlays or amalgam is clearly indicated. The difficulties of keeping such cavities dry, especially when they extend under the gum, as many of them do, are so great, and the application of the dam is so painful, that the inlay method is usually preferable to gold foil. In cases where economy is paramount amalgam may be used, but the margins of amalgam fillings in this class of cavity are seldom satisfactory after a few years of service, and inlays should be inserted wherever possible.

PIT CAVITIES IN THE LINGUAL SURFACES OF INCISORS AND IN THE OCCLUSAL THIRD OF THE BUCCAL SURFACES OF MOLARS.

Here is a condition where the teaching may be definite and dogmatic. There is really only one kind of filling material indicated for these cases, and that is gold foil, usually in an unannealed form. The nature of the decay, the manner of its progress, and the position on the teeth, all combine to indicate foil and to contra-indicate inlays, while the ease with which foil may be inserted renders it foolish to attempt inlays. A cavity of this kind once properly prepared and filled with foil may be looked upon as about the most permanent operation that can be performed in the human teeth, and it is usually neither difficult nor painful.

CONCLUSION.

The foregoing consideration of the indications for the various filling materials has been guided by the thought that the aim of the profession should be in the direction of preventing cavities instead of filling them; but the essayist's conviction is strong that it will yet be many years before prevention becomes an established fact. and in the meantime the best service we can give our patients is to arrest caries as it arises, by filling the cavities. In doing this, it is well for us to study carefully the indications for the use of the materials at our command, so that we may employ them to the best advantage and for the welfare of those whom we serve.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

MAGNESIUM OXYCHLORID CEMENT AND DENTAL PLASTERS, WITH A REVIEW OF SOME EXPERIMENTAL WORK PERTAINING TO BOTH.

By WM. LEON ELLERBECK, D.D.S. (Univ.Pa.), Salt Lake City, Utah.

(Read before the joint meeting of the California State Dental Association and the Southern California Dental Association, at Yosemite Valley, Cal., June 29 to July 2, 1914.)

IN reporting some observations made in the course of several years of experience in the manufacture of gypsum products, and the results of some experimental work with reference to the physical behavior of dental plasters when mixed with varying quantities of water and with different catalyzers, the writer is imbued with a desire to assist in solving, if possible, certain of the problems which confront the conscientious dentist in his effort to secure positive and satisfactory results in such of his operations as may require the use of dental plasters.

These experiments are not as comprehensive as either the writer or the reader might wish, nor as many as might be thought necessary to decide fully certain of the questions involved; however, the experiments were carefully conducted and are fairly decisive, so far as they have gone, though in some respects at variance with the findings of others, who have attributed virtues to certain catalyzers, in the way of expansion control, which, *per se,* they do not seem to possess.

In suggesting the possibilities for certain dental uses of magnesium oxychlorid (so-called Sorel's cement), the writer is aware that this product has a history of some two centuries, but there seems to be no reference made to it in dental literature calling attention to its possible dental uses, nor has the writer at any time heard any reference made to it by any member of our profession, though to some it may present the hoary head of antiquity, and they may already have determined its practicability for dental purposes, and have also disclosed wherein the material may be unsuited to the several purposes herein suggested.

We will give first attention to this product.

MAGNESIUM OXYCHLORID CEMENT.

It appears that when properly prepared this material is capable of producing casts which will almost entirely do away with the necessity for metal dies in metal plate work, as it is amply hard and will stand such a high crushing test as to easily withstand any reasonable treatment in the swaging process of any of the metals we are likely to use, such as gold, aluminum, platinum, or thin iridio-platinum. Certainly with the use of two casts, the second one to be used for final shot-swaging, the material presents more desirable properties and fewer inequalities than zinc or low-fusing metal dies. There is a decidedly better definition of the rugæ and the suction chamber, when the latter is used—and by virtue of this definition the suction chamber may be more often dispensed with.

For vulcanite dentures the material presents fruitful possibilities—for, as with the casts used for swaging, it appears from the writer's experiments that the volume change may be controlled within the limits of safety, and since the material has a compressibility far below that of gypsum plaster, with less attendant danger of distortion under pres-

sure, and since the smooth glossy surface supplants in the simplest way the use of tin foil to give the vulcanite a similar glossy surface, so highly desirable from a hygienic standpoint, and to eliminate irritation of the mucous tissues—it is to be hoped that the material may work out as satisfactorily as it seems to promise.

There is naturally a closer adaptation than when tin foil is used, as the thinnest foil which can be used to practical advantage must increase the surface area somewhat. The main objection in vulcanizing may lie in the difficulty encountered in separating the plate from the cement after vulcanization, though vulcanized shells were made with pure magnesium oxychlorid cement, and the same cement mixed with an even volume of standard Ottawa sand. In each instance the flasks were permitted to stand several hours after having been taken from the vulcanizer, and rehardening of the cement doubtless occurred. This was not intentional, but occurred by reason of the fact that the writer's time was taken up by other matters of pressing importance, and opportunities for making new plates have not since presented. However, most of the cement was easily prized away, and the adhering parts were fairly easily removed by digesting in dilute hydrochloric acid, in which the magnesium compound is fairly soluble. The writer has not for several years personally attended to any vulcanite work, and will probably have little opportunity to do so in the future; hence the matter is passed to those more especially interested and more able to note such practical advantages or disadvantages as the use of this substance may involve. The writer's opinion is, however, that some considerable experimental work remains yet to be done before this material can be truthfully pronounced as being satisfactory for vulcanite work.

That magnesium oxychlorid cement will prove of value for casts there can be no doubt. Orthodontists will at once see the importance of securing more enduring models which may be kept very clean; even though dust may accumulate, the original beautiful luster may be restored by washing in alcohol or water. Incidentally, the orthodontist may construct appliances with greater safety to his casts than with the more fragile plaster. To the dental student, for the construction of casts in operative technique, the material is ideal. It behaves much the same as dentin toward the bur or chisel, the edges are sufficiently sharp, and the material is hard enough to answer admirably for many practice operations. If properly modified, the material may have a mechanico-therapeutic value in root-filling operations, though too great a solubility with prolonged irritation to the apical tissues may preclude its use for such purposes.

The following method of preparation and special treatment the writer has found essential in producing a result presenting at least such desirable characteristics as to furnish a practical working basis from which modifications may be made in accordance with findings from further experimental work.

Unfortunately the literature available seems quite unreliable, and leads merely to negative results so far as applicability to dental purposes is concerned. The writer's experiments, which have been many, may be of value in saving the prosthetist time and possible disappointments, which he would be sure to experience were he to work from the brief and uncertain data that are given for preparing the products for certain uses in the arts.

The neat cement is made by triturating magnesium oxid with a solution of magnesium chlorid. The writer has employed only products of comparatively high purity—Merck's "light calcined magnesia" and Merck's "high purity crystals" of $MgCl_2$. Possibly a commercial oxid may be found of such purity as to answer all practical purposes; likewise, a sufficiently pure commercial magnesium chlorid may be secured from the chemical supply houses or manufacturers for a considerably cheaper price than the chemically pure article. It is evident, however, that considerable

care must be used, since the material seems sensible to slight modifications; if, for instance, water is used that contains much lime or other elements of impurity, the casts do not present the beautiful luster resulting from the use of pure materials mixed with pure water, and this may be an evidence of the fact that it may be difficult to procure commercial products which will bring out the fullest possibilities of the material. Bearing further on this. Dr. Frederick W. Huber, consulting chemist for the Riverside Portland Cement Co., Nephi Plaster & Mfg. Co., and many of the larger mineral earth manufactories of the West, is authority for the statement that over one per cent. lime as an impurity in magnesium oxid is detrimental, as it produces undue volume change. He incidentally remarks that dead-burned magnesium oxid should not be used. Prof. A. V. Bleininger, of the U. S. Bureau of Standards, gives the calcining limitation as 900° C.; sintering tends to occur at higher temperatures.

PREPARATION OF CEMENT MIXTURE.

Merck's high purity $MgCl_2$ crystals were dissolved in distilled water until a density of 30° Baumé is reached. The proportion of 100 cc. of the solution to 50 grams MgO is used. It is a good plan to draw the liquid from the buret directly into a large Wedgwood mortar, and then at once add one-half of the MgO, triturating quickly to a creamy consistence. The balance of the MgO is then added and triturated thoroughly. At first it appears as if the MgO were in excess and a doughy mixture would result, but a few minutes' trituration will bring the mixture to a creamy consistence. The mixture thins down perceptibly on standing thirty minutes, when it may be poured; it will, however, require two or three hours before the initial setting begins, as the hydration is slow, or the material may have an affinity for carbon dioxid and possibly draw a certain amount from the atmosphere. At least an analysis of a portion of the aged set material seems to show a certain conversion of the MgO to $MgCO_3$, though the writer is not prepared to say whether the carbon dioxid has a progressive catalytic effect in the earlier stages of the mixture.

Suffice it to note that the material is slow-setting, and may be mixed in an available moment some hours before using, and that, if kept in a cool place, it will be splendidly workable for at least that period of time. Haste is not essential in running the casts, and there is no excuse for air-bubbles, if reasonable care be exercised. Applying the material with a soft pencil-brush is advisable, subsequently jarring the model to settle the further additions of the pour to insure perfect casts. In making casts for preservation or for constructing orthodontic appliances or for student's operative technique, the neat material answers admirably. For vulcanite work some modification must be made to overcome the volume change, and for this purpose the writer has found that the addition of an even volume of standard Ottawa sand to the still fluid cement mixed according to directions, reduces contraction to 0.0031, which will about offset the expansion in the average plaster as ordinarily mixed. Incidentally the mixture has a desirable fluidity and is a splendid working mixture, ideal for making casts for swaging purposes, and the surface approximating the mold will be smooth in proportion to the mold surface.

This same mixture furnishes a good experimental basis for vulcanizing work. When impressions of modeling compounds such as Kerr's are used, there is a natural tendency for the cement to absorb coloring matter if iron oxid pigments form the coloring element. Hence coating the impression with a thin sandarac varnish is desirable, to prevent undue adherence, and again, the beautiful gloss of the dried varnish is reproduced on the approximal surface of the cast. The more or less spherical Ottawa sand particles have few if any sharp edges, hence there are no projections to roughen the surface. Even though the sand may show through, a thin film of cement seems to cover each particle, thus produ-

cing an unbroken surface. Under the microscope, few if any breaks are apparent, unless the case be unnecessarily roughly handled and scratched. The crushing strength of the sand-cement mixture is 4250 lb. per sq. inch, as against approximately 850 lb. in both Nephi and French Laboratory plaster, and again, its volume change is only 0.0093, or less than the contraction observed in the cooling of zinc from the fluid state. Hence, in vulcanite work, this material should largely eliminate the error of distortion, and for swaging plates it presents the distinct advantage over zinc of producing more easily a cast of decided definition, and therefore should, to a large extent, replace that metal.

From a chemical viewpoint little definite is to be said on the subject. Stoichiometrical calculation of the proportion of $MgCl_2$ solution and MgO as given by the writer shows an approximate chemical formula of $1MgCl_2 + 3MgO + 10H_2O$. What may be the final analysis after the possible absorption of carbon dioxid from the atmosphere and the final water content due either to loss by evaporation or hygroscopic increase, as the case may be, the writer has had no opportunity as yet to determine. The phenomenon of the material, however, becoming more liquid during the first hour after mixing and before setting may be due to a hygroscopic tendency and increased liquidity induced by the acquisition of atmospheric moisture, or again, it may result from the progressive solubility of the MgO particles prior to union with the $MgCl_2$, a phenomenon concomitant with the hydration of gypsum plaster during the setting process.

As a matter of information, and on the presumption that Merck's high purity crystals of $MgCl_2$ as packed for the trade are of uniform purity, the following figures represent a deductive percentage analysis of the solution and mixture:

To produce a 30° Baumé solution of $MgCl_2$, 412.13 grams $MgCl_2$ crystals were required to be dissolved in 250 cc. of distilled water, making a total of 662.13 grams, measuring 515 cc. One cc. of this solution on analysis gave a chlorin content of 0.33682 gram, or 26.2 per cent., which will combine with the 0.11385 magnesia to form 0.45069 gram $MgCl_2$. Therefore, 0.45069 times 515 (total volume of solution) equals 232.105 grams of anhydrous $MgCl_2$ in 515 cc. of solution. Deducting 250 cc. of water from 403.025 cc. (the total water content) leaves a balance of 180.025 grams of water, and possible impurities, in the 412.13 grams of hydrous $MgCl_2$ crystals used.

By calculation, then, there is 43.68 per cent. of water in the hydrous $MgCl_2$ crystals used. On the presumption that the crystals contain little or no impurities, the water of the solution amounts to 64.94 per cent., of which 58.1 per cent. is added water and 41.9 per cent. derived from the crystals. These figures are given merely because it may be sometime necessary to make a calculated solution rather than to prepare a solution under hydrometric readings—which after all is the simplest method, though sometimes the preparation of a small amount of solution may be best done by measuring the water and weighing the salt in any proportions relative to the figures given above. While there may be some slight efflorescence on the surface of the casts made by the 30° Baumé solution used in the proportion of 100 cc. to 50 grams of MgO, this efflorescence may be readily removed by a cotton pad moistened in water or alcohol. The slight efflorescence may appear again after a few days. This may be similarly removed, and thereafter the efflorescence seems to cease. It appears to be a slight expression of an excess of $MgCl_2$, apparently required in the preparation of the material for desirable fluidity, but not required in finally satisfying the MgO content, to produce a balanced compound. This has not been proved, and the solidified mass may represent a true chemical compound with the eutectics MgO and $MgCl_2$.

The above formula shows less efflorescence than results from any other proportions of MgO and $MgCl_2$ with which

the writer has experimented, and when the even volume of Ottawa sand is added there appears to be no efflorescence whatever. In any event, the extent of efflorescence is quite inconsequential if the formula suggested be used. The sand and cement mixture in even volumes as stated shows a linear contractile coefficient of only 0.0031, in three days, practically offsetting the expansion of plaster, and producing, from a slightly expanding plaster impression, a reverse volume change which should largely eliminate a source of error with which we have heretofore been confronted. The writer confesses that he has had difficulty in finding a suitable medium for separating cement casts from plaster impressions. One coating of sandarac varnish seems insufficient to prevent the porous plaster from casually absorbing water from the cement material while the latter is still fluid, with the result that the cast is chalky and tends to warp or crack. It is not desirable, of course, to create a factor of error by using too thick a separating medium—as, for instance, several coatings of varnish; hence other means of separating must be employed. Possibly boiling or simply immersing the impression, tray and all, in thin oil for some time, may overcome the difficulty. Boiling the impression in wax answers admirably, but in the absence of any tests determining possible volume changes of impression plaster thus treated it is not safe to assert that this method is advisable.

Kerr's separating fluid worked well in some instances and failed in others, but in all cases seemed better than sandarac varnish. A thin solution of shellac in alcohol acted fairly well.

If Kerr's impression compound is used, care should be taken not to overheat the compound prior to separating it from the cast. It is preferable to hold it for some time in water for temperature not exceeding 120° F. Under such conditions the cast separates splendidly, with no tendency to absorb coloring pigments, and any adhering portions of the compound may be easily prized from the cast with a dull spatula, or even the finger-nail. The cast is so hard, however, that there is little danger even from a knife-blade, if used with reasonable care. As there is a normal linear shrinkage in Kerr's impression compound, on cooling from 120° to 80° F., amounting to 1.18 per cent., together with a slight shrinkage in the cement-sand mix, this together with the shrinkage of rubber in vulcanizing may create a factor of error great enough to cause the casts from the impression-compound impressions to be at once valueless in vulcanite plate work. This may be only determined definitely by making practical cases for trial. Theoretically it appears that the plaster impression method with suitable separating medium presents a better likelihood of success, though at this point it may be well to call attention to the fact that the cement will hold and bind rigidly three or even more volumes of sand, and the contraction is lessened as the proportion of sand is increased.

If a thin veneer of neat fluid cement be painted over the surface of the compound impression, the heavy sand mixture may be packed if not almost poured to make the balance of the cast, and as the sand sinks into the veneer of neat cement, the surface of the cast is beautifully smooth as with a 1:1 mixture, and there seems to be no crazing of the thin veneer. The writer has made no test of vulcanizing on the heavier sand mixture, and is unable to report its behavior under vulcanizing conditions. It may be well to remark, too, that the tests for compressibility of the neat and the 1:1 mixtures have been made at room temperatures and not under vulcanizing temperatures or in the presence of moisture or steam pressure. While nothing may be taken for granted, it is fairly safe to presume that the cement mixture will show the same relative resistance to compression in a moist and heated state or as in the dry cool state, or as plaster under like conditions.

This deduction is made merely from observations of the solubility and porosity of the material as compared with plaster.

GYPSUM PLASTERS.

It is difficult indeed to discuss with reasonable brevity the subject of gypsum plasters, for this necessarily involves consideration not only of the physical and chemical differences in the gypsums of different deposits, which are as variable as they are numerous, and the chemical and physical differences in the plaster made from each, but also of the wide variation in the characteristics of the plasters which it is possible to produce from any individual deposit. To say that plaster shows a certain coefficient of expansion, certain compressibility, tensile strength, etc., is about as reasonable as to ascribe definite characteristics to cheese, of which, as with plaster, there are hundreds of varieties. One of two brands of cheese may appeal to our taste more than the other. We may not, however, have determined the heat calories expressed by equivalent quantities of each when taken as food, nor yet the general effect of each upon our health. So, too, the dentist may have discovered that one of several brands of plaster appears to work more to his liking than others, and yet, owing to failure to determine in a definite way certain desirable characteristics necessary to secure a maximum efficiency for the several purposes to which the product may be put, he may unconsciously be employing a material which has undesirable factors of error to a maximum degree, which might be reduced to a minimum by the employment of another.

As merely illustrative of variations in gypsum and plasters, it is common knowledge among manufacturers that, even though they select two gypsums of practically or exactly the same composition as far as their calcium sulfate content is concerned, grind each to the same degree of fineness, calcine each under exactly the same conditions as to time and temperature, yet the plaster produced from the two may vary widely in behavior. One may require more water than the other to attain the same degree of fluidity for a practical working mixture. One may set comparatively quickly. The other may evolve, through the process of hydration, heat sufficient to ruin a glue mold, and thus be a dangerous material to employ in making casts for which glue molds are used. One may become hard and show a high tensile and crushing test; the other may appear more or less chalky and show generally low physical tests. Just what causes the difference has never been satisfactorily explained, so far as the writer has been able to discover, though the explanation possibly lies in the difference in crystallization due to geological influences at the time and subsequent to the formation of the material. That different physical characteristics may cause wide differences in the behavior of any substance may be most readily shown in the behavior of colloidal silica as compared with crystalline silica, both having the same chemical formula (SiO_2). The colloidal silica is a road-binding material of great value, while the crystalline silica is practically worthless when applied for that purpose. Numerous other examples might be cited.

Going still farther, the process of manufacture may induce widely different characteristics in the behavior of the same gypsum. A striking example is observed when calcined plaster is passed directly through the screens as it comes from the calcining kettles, without being subjected to any comminuting impact process. The same plaster, after being subjected to the impact, will ride the screens; it is even difficult to make a screen test of it at all. The alteration or modification does not end here, however, for the product is modified in its behavior in mixing. More water is required to attain the same degree of fluidity for a practical working mixture than will be required for the material which has not been subjected to the impact process, and again, the plaster shows physical inferiority in the crushing and tensile strength tests, though, on the other hand, slightly less volume change on setting because of execessive water required for the mixture. Some

of these differences are amply shown in tests 3, 4, and 7 of the crushing strength tests.

Nos. 3 and 4 are made from identically the same gypsum as No. 7, the latter alone having been subjected to the impact process. Analyses of the materials show them to be identical; nor is the difference due to a dehydrating influence from the impact, as might possibly be supposed, since the water content has not been appreciably disturbed. The alteration is probably a result of some physical change. The writer's reason for calling special attention to this matter is to warn the dentist that he may be wholly unaware of the real characteristics of the plaster he may be purchasing. Many of the manufacturers themselves seem to be unaware of the differences which different processes may bring about in their finished product, and, as it may look white and appear to be the same, it is very evident that the dentist should exercise some care in the purchase of his plaster, since even though he always purchase his supply from the same manufacturer he may be getting a variable product. The simplest physical test known to the writer is to grasp a handful of the plaster. If it is a reground product the material will tend to form a more or less coherent bolus in the hand. The screened material which has not been subjected to impact will squirt out of the hand like water. Of course this is not the only test on which a dentist should depend for the choice of his plaster, as the plaster manufactured from some gypsums, even though not reground, may show tests far below those required to secure the highest efficiency in dental use.

Several articles have been presented on the subject of dental plaster, chiefly those by Dr. Stewart J. Spence and Dr. J. H. Prothero. Dr. Spence's determinations were not made with instruments of precision insuring accurate comparisons, and though his observations are interesting, they are rather grossly empirical. Dr. Prothero's experiments as published in the Illinois State Dental Society Transactions of May 1903 and May 1905 were of a more definite character. Dr. Prothero contrived a dynamometer to determine the comparative compressibility of plaster mixed under different conditions and a self-recording micrometer to show the volume change under various influences. The writer was unable to secure the instrument in order to make comparisons with the method to be described, and Dr. Prothero has not given many tabulated data concerning the tests of different plasters. Since it is very possible that he was unaware of the previous treatment given to the plaster which he tested, the record of his experiments lacked that value which it might otherwise have had. He speaks of having used the French plaster sold by the S. S. White Dental Mfg. Company, and the samples of this material which the writer has tested, as dispensed to the supply houses, appears to have splendid characteristics for dental uses. In the absence of any knowledge as to the particular method of preparation, however, and on account of the fact that the writer found it impractical, because of limited time, to secure samples from many different packages, it is impossible to state whether the product is uniform in all cases; hence, as in the case of Dr. Prothero's experiments, we do not know whether the material is an accelerated plaster, or is all or in part a reground product. It may be well to explain at this point that the manufacturer may supply what is known as a laboratory plaster, and a product known as an impression or accelerated plaster.

Various means of acceleration may be employed. The writer can see no reason for enshrouding trade processes with an air of mysticism, for, in the first place, it is difficult to maintain these secrets long; and again, there should be a more professional attitude among the producers of mineral earth products, and a frank discussion of methods, if the best results are to be obtained. Therefore, a brief description of an accelerating process is given, as in the case of accelerated plaster from the mill of the Nephi Plaster and Mfg. Co. Nothing appears

to have been published in dental literature or in the literature of gypsum calling attention to this method, though it is interesting and valuable.

As a prelude, it may be stated that in the plaster trade frequent complaint is made by the mortar-mixer that the plaster is setting with undue rapidity, and he begins to blame the manufacturer for having supplied an insufficiently retarded product for wall-making purposes. Careful investigation may show that the mortar-mixer has not cleaned his mortar-box, and has left set plaster which is included in the subsequent mixture. Secondly, he may have washed a bucket or the mixing tools in a barrel of water intended for the mixture. This water will include a certain amount of set plaster in a fairly fine state of division and partial solution. The next batch of plaster mixed in the unclean mortar-box and with the unclean water may set with great rapidity—too quickly, in fact, to be applied to the walls smoothly before setting begins. The remedy is obvious, viz, clean mortar-boxes and clean water; conversely, quick setting can be induced by including an amount of set plaster either in suspension in the water to be used. or in the powdered form, and thoroughly admixing it to the calcined material. Thus the secret is out. The mill practice is to make a mixture of plaster, and while it is undergoing the initial setting, to churn it to a light, almost frothy condition. Upon drying out thoroughly, this material is comminuted and the fine dust is drawn by means of a fan into a settling chamber. A small percentage, viz, about 3 per cent., added to and thoroughly admixed in a plaster which has a normal setting time of twenty minutes will cause the plaster to set, when similarly stirred and treated, in about five or six minutes. The great advantage of this method of acceleration over the use of sodium chlorid or potassium sulfate or any other chemical accelerator is that the product has a better physical structure, presents a smoother surface for impressions and is less fragile. It is therefore easily possible to make an impression plaster to which no saline chemical accelerator need be added, and which will nevertheless have a setting time quick enough to require reasonable speed upon the part of the operator to manipulate it properly. In using a laboratory plaster, of course it is well to employ one which shows a minimum compressibility and reasonably low expansion, and sets with desirable surface hardness and smoothness.

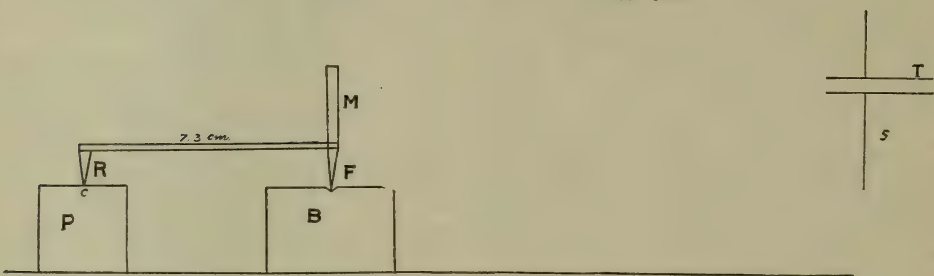
These physical requirements have been referred to in the experiments of both Dr. Spence and Dr. Prothero. It would seem almost an unreasonable waste of time to adopt scientific methods in the production of an artificial denture, resorting to the anatomical articulator, special methods of securing the bite, etc., if we are to have the whole process modified by encountering undue volume changes, first in the impression and secondly under applied pressure in the flasking operation. At least it is well that these be reduced to the lowest possible minimum.

Dr. Prothero, in commenting upon the fact that he had made certain observations on the behavior of plaster difficult to explain, voiced the suspicion that probably the methods of preparation at the plaster mills may be in part responsible for the variations noted. In this surmise, of course, he was correct; this matter, the writer feels, has been covered fairly well in the preamble.

From the foregoing it may be easily seen that those purchasing plaster from various mills for the manufacture of investment compounds may, like the dentists, do well to determine definitely the kind and behavior of the material supplied to them, for obvious reasons. Unfortunately, the limited time at his disposal has made it impossible for the writer to conduct enough tests to show all the physical variations in expansion, crushing strength, compressibility, etc., which may result from different methods of admixture, rapidity and time of stirring, and different temperatures of the water added to the plaster preparatory to its use. This limitation also precluded the testing of many plasters,

so the experiments were confined to French's plaster, as sold by the S. S. White Dental Mfg. Company, which has gained some reputation throughout the country at large, and the Nephi plaster, which is known more especially in the West. The results of the tests show no wide variations in these products as compared with one another. With a view to showing the degree of care exercised in testing these materials, the following data may be of value to those especially interested in this subject.

FIG. 1.



(Not to scale.)

EXPANSION OF PLASTER ON SETTING, AND THE INFLUENCE OF EXCESS WATER AND OF ACCELERATORS.

The physical problem involved is the accurate measurement of the small change in length which takes place when a plaster casting sets. For this purpose an optical lever as shown in Fig. 1 was used. A mirror M is mounted on a small table which rests on three legs. The two legs F directly under the mirror rest in conical depressions in the iron bar B, while the third leg R in this case rested on a small microscope cover-glass pressed lightly into the top of the cylindrical casting P. The mold, a split brass cylinder exactly one inch in length, was filled with the plaster material while resting on a glass plate which remained in position throughout the operation, so that all expansion must be upward. Any motion of the leg R causes the mirror to rotate about a line through F, and the amount of this rotation is calculated by observing the displacement of the reflection of the scale *s*, with reference to the cross hairs of the telescope T.

FIG. 2.

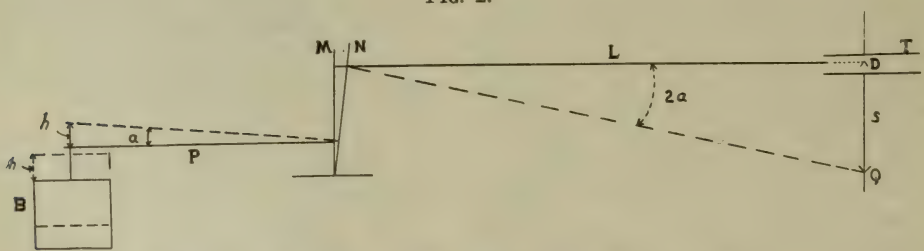


Diagram to illustrate use of optical lever. (Not to scale.)

The theory of measurement and the method of calculation are illustrated in Fig. 2. Suppose the cylinder B to expand as shown by the dotted lines to a certain amount—*h*. The mirror is by

this expansion tilted forward through an angle a which is measured, if small, by the ratio $\frac{h}{p}$, p being the distance from the line joining the front legs to the rear leg, viz, 7.38 cm. in the instrument used. Since in the case of reflection, the angles of incidence and reflection are equal, and since the perpendicular to the mirror, of course, turns through the same angle as the mirror itself, it follows that, when the mirror is tilted through the angle a, both the angle of incidence and the angle of reflection must be changed by this amount if light is to be reflected in a fixed direction. As a result of this tilting, the point of the scale seen on the intersections of the cross hairs of the telescope, will therefore change by an amount s that

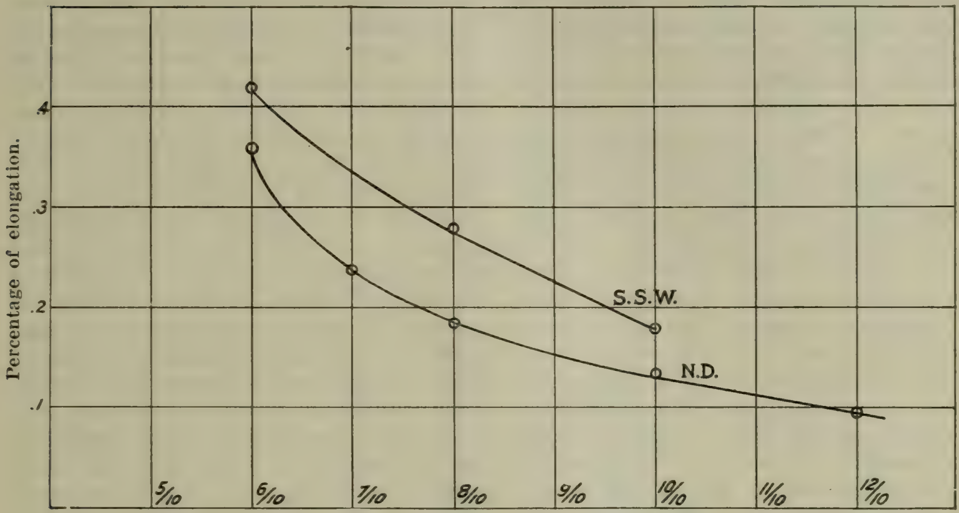
$$\frac{s}{L} = 2a,$$

L being the distance from the mirror to the telescope and scale; we have therefore

$$a = \frac{h}{p} = \frac{s}{2L} \text{ and } h = \frac{p}{2L} \times s.$$

L and p are constant and easily measured, while s can be read on the scale with great accuracy.

FIG. 3.



Ratio of water to plaster.

Variation of expansion on setting with amount of water used.

Mixture.	Per cent. expansion. N. D.	S. S. W.
60 cc. H_2O : 50 gm. plaster	.096	
50 " " " "	.135	.18
40 " " " "	.185	.28
35 " " " "	.24	
30 " " " "	.36	.42

As used, the system multiplied the actual motion of the cylinder about 75 times, giving maximum deflections on the scale of one or two centimeters. Since tenths of millimeters could be estimated with a good degree of accuracy, the results should be reliable to about one per cent. for the largest variations. For the smallest variations, the possible error rises to about 10 per cent. Inasmuch as it is desired to determine whether or not the differences in expansion due to varying proportions of water

and to the addition of sodium chlorid or potassium sulfate are great enough to be of importance, rather than to determine accurately the absolute values of the expansions, this degree of accuracy may be considered satisfactory. The results of this part of the work are shown in Fig. 3.

It will be seen that the expansion on setting decreases rapidly as the quantity of water used increases. Of course, the thinner mixtures require a longer time to set, and the resulting castings are inferior in hardness and texture to those in which a smaller quantity of water is used. The addition of either common table salt (NaCl) or potassium sulfate (K_2SO_4) greatly accelerates the setting of the plaster, without apparently producing any direct effect on the expansion; indirectly, the expansion is likely to be affected by the addition of these agents, since a greater quantity of water is required to secure the same degree of fluidity when they are used.

There is no important difference between the French and Nephi plasters, as packed for the market, either in physical behavior or, as will be shown, in chemical make-up. In fact, the writer would be inclined to question the results of the chemical analyses because of the slight comparative variations noticed in these products, were it not for the fact that these tests were made personally by one of the most competent and careful analytical chemists, Prof. W. C. Ebaugh, Ph.D., formerly of the University of Pennsylvania and now professor of chemistry in the University of Utah.

No attempt was made to determine the amount of the initial contraction which goes on before the process of setting begins.

In some cases, a slight contraction was observed following the period of expansion. This was most marked when the accelerators were used, and is probably due to the fact that the temperature rose during the setting, because of the liberation of heat of hydration, and when this process was completed, the fall in temperature which followed was accompanied by contraction.

Specimens which were allowed to remain in position over night showed a continued slow expansion during that period amounting to from one-third to one-half of the total expansion.

The notations on physical tests of plasters, which are presented in what follows, are given with a view to showing more clearly the effects of varying quantities of water and of different catalyzers used. As stated, the experiments were limited to two brands of plaster. It is unfortunate that the lack of time precluded the possibility of testing other brands. In the case of the Nephi plaster, the results are given to show how different methods of preparation at the mill may be employed to affect the behavior of the material, which is a fair indication that the same variabilities could be induced in other brands of plaster by similar differences in treatment. It must not be inferred, however, that a satisfactory plaster for dental uses may be made of all gypsums; this is not the case, because of the characteristics inherent in certain deposits which make them unsuited for this purpose; attention has been called to this in the earlier part of this paper.

In any event, the determinations will show conclusively the necessity for care upon the part of all manufacturers in order that they produce the best possible material from the particular gypsum on which they may have to depend.

In the crushing tests hereafter noted and on the curve sheet the tests of magnesium oxychlorid are also recorded, in order to give a basis of comparison, and to show the possibilities of this material for certain uses heretofore suggested. It will be noted that the tensile strength tests of plaster were made with 45-minute and 24-hour briquets—not that this material is nearly as strong as would be shown in a 14-day test, but because these periods of time are more apt to represent the working conditions to be met with in dental practice. The screen tests of Nephi impression plaster are

given merely to show the degree of fineness possible to obtain by the fanning method in the production of dental plaster without the application of impact. Under the compression tests is also included the modulus of elasticity and the crushing strength of the magnesium oxychlorid cement, both neat and with the 1 : 1 sand mixture, to illustrate again the possibilities of this material for the purposes heretofore suggested. It may be noted that a moist plaster briquet shows a higher tensile strength than the material which has dried out over night. This does not indicate that the briquet would not become stronger if aged for some weeks, but it does indicate fairly well that even when moist, as in the vulcanizing process, the strength of the material is not greatly altered, and since there seems to be an established ratio between the crushing tests and tensile strength tests, it may be expected that the crushing strength under vulcanizing conditions is not materially impaired. It is rather difficult, however, and would take some considerable time, to construct apparatus to determine exactly what the behavior of either the magnesium oxychlorid cement or the

Data on Expansion of Dental Plasters while Setting.

N.D. = Nephi dental plaster. S.S.W. = S. S. White dental plaster (French's).

Test No.	Plaster.		Cc. water used.	Expansion coefficient.	
	Kind.	Grams.			
1	N.D.	50	50		
2	"	50	50	.0017	
3	"	50	30	.0033	
4	"	50	30	.0041	Av. .00353
5	"	50	30	.0032	
6	"	50	40	.0017	
7	"	50	35	.0024	
8	S.S.W.	50	30	.0036	
9	"	50	30	.0050	Av. .00447
10	"	50	30	.0048	
11	"	50	40	.0026	
12	"	50	40	.0031	Av. .00283
13	"	50	40	.0028	
14	N.D.	50	40 NaCl*	.0021	
15	"	50	60 "	.0007	
16	"	50	60 "	.0006	Av. .0058
17	"	50	60 "	.0010	
18	"	50	60 "	.0000	
19	"	50	50 "	Lost	
20	"	50	50 "	.0010	
21	"	50	60 " †	.0012	
22	"	50	60 "	.0015	Av. .00137
23	"	50	60 "	.0014	
24	"	50	60 K_2SO_4‡	Set too fast.	
25	"	50	60 " §	.0013	
26	"	50	60 "	.0012	Av. .00105
27	"	50	60 "	.0007	
28	"	50	60 "	.0010	
29	S.S.W.	50	40 "	Too quick; not tested.	
30	"	50	50 "	.0020	
31	"	50	50 "	.0017	Av. .00183
32	"	50	50 "	.0018	

* 2 drams NaCl to 6 oz. H_2O.
† 1 dram NaCl to 6 oz. H_2O.
‡ 1 dram K_2SO_4 to 6 oz. H_2O.
§ ½ dram K_2SO_4 to 6 oz. H_2O.

dental plasters at the vulcanizing temperatures and in a moist atmosphere would be; but while it may not be taken for granted, it seems almost safe to assume that the comparative values of the materials in the dry state will be retained under vulcanizing conditions.

It was found that the first quantities of NaCl and K_2SO_4 caused too rapid setting for a practical working mixture: hence the proportions 1 dram NaCl to 6 oz. H_2O, and $\frac{1}{2}$ dram K_2SO_4 to 6 oz. H_2O were used.

In the course of work on the effects of NaCl and K_2SO_4, certain peculiarities were noticed which led to the following careful examination of all data, to determine the effect of the ratio of water to plaster on the expansion during setting. Using all Nephi dental plaster castings made, the following was observed:

Water to Plaster, 1.2.

No. 15.	N.D. and NaCl	.0007
" 16.	" " "	.0006
" 17.	" " "	.0010
" 18.	" " "	.0000
" 21.	" " "	.0012
" 22.	" " "	.0015
" 23.	" " "	.0014
" 25.	" " K_2SO_4	.0013
" 26.	" " "	.0012
" 27.	" " "	.0007
" 28.	" " "	.0010
	Mean	.00096=.096 p. c.

Water to Plaster, 1.0.

No. 2.	N.D.	.0017
" 20.	"	.0010
	Mean	.00135=.135 p. c.

Water to Plaster, 8/10.

No. 6.	N.D.	.0017
" 14.	"	.0020
	Mean	.00185=.185 p. c.

Water to Plaster, 7/10.

No. 7. N.D. .... .0024=.24 p. c.

Water to Plaster, 6/10.

No. 3.	N.D.	.0034
" 4.	"	.0041
" 5.	"	.0032
	Mean	.0036=.36 p. c.

A curve (see Fig. 3) was drawn using per-cent. expansion and water-plaster ratios as co-ordinates—showing a nearly simple inverse ratio when the ratio rises above 6 to 10 (30 cc. to 50 gm.). It does not appear that the addition of either NaCl or K_2SO_4 can be said to have any marked effect on expansion. The corresponding data for the S. S. White (French's) plaster are—

Water to Plaster, 1.0.

No. 30.	S.S.W. and K_2SO_4	.0020
" 31.	S.S.W. and K_2SO_4	.0017
" 32.	S.S.W. and K_2SO_4	.0018
	Mean	.0018=.18 p. c.

Water to Plaster, 8/10.

No. 11.	S.S.W.	.0025
" 12.	"	.0031
" 13.	"	.0028
	Mean	.0028=.28 p. c.

Water to Plaster, 6/10.

No. 8.	S.S.W.	.0036
" 9	"	.0050
" 10	"	.0040
	Mean	.0042=.42 p. c.

It will be seen that in general the expansion of the S. S. White plaster is slightly greater than that of the Nephi dental plaster with the same water-plaster ratio. The expansion of S. S. White plaster 1 to 1 is, for example, 1.3 times that of the Nephi dental plaster 1 to 1; that of the 8 to 10 is 1.5 times greater, and that of the 6 to 10 is 1.2 times as great.

It may be stated that the expansion on setting in these plasters is never above $\frac{1}{2}$ per cent.; that it is not greatly influenced by the action of such accelerators as NaCl and K_2SO_4; that it is largely influenced by the amount of water used. The 6 to 10 and the 8 to 10 ratios are those of the mixtures generally used.

Tensile Strength Tests—Nephi Dental Plaster.

Six briquets were used for averages in all tests.

1. Straight Dental, accelerated with 3.5 per cent. gypsum catalyzer:

200 lb. break—45 minutes old.
190 " " —24 hours old.
Used 65 cc. water to 100 gm. plaster.

2. Dental with 1 per cent. NaCl in water used:

168 lb. break—45 minutes old.
160 " " —24 hours old.
Used 65 cc. water to 100 gm. plaster.

3. Dental with 1 per cent. potassium sulfate (K_2SO_4) in water used:

(No tests were made, as the briquets were full of bubbles no matter how carefully mixed. These seemed to be due to gas evolved in the reaction.)

4. Regrind plaster with 3.3 per cent. gypsum catalyzer:

8-minute set (normal setting time 20 minutes). Required 100 cc. water, and consequently was very weak and unsuitable for dental purposes.

Alum as a catalyzer also produced effervescence, making the casts porous.

With varying amounts of H_2O.

Three briquets were used for each mixture. The tensile strength is given in pounds per square inch cross section; average, 45 minutes' time.

Water to Plaster, 100 gm.

Cc.	Lb. per sq. inch.	
50	224	Very stiff mix.
55	218	
60	197	Medium stiff mix.
65	159	
70	143	Thin mix.
75	126	
80	111	

Screen Tests—Nephi Impression Plaster.

Per cent. on 20 mesh sieve	0.00
" " " 40 " "	0.00
" " " 60 " "	0.00
" " " 80 " "	0.00
" " " 100 " "	0.00
" " " 200 " "	1.00
" pass'g 200 " "	99.00
	100.00

CRUSHING STRENGTH TESTS OF MAGNESIUM OXYCHLORID CEMENT AND DENTAL PLASTERS.

The following results were obtained in the crushing strength tests made with two-inch cubes of magnesium oxychlorid cement and cubes of set plaster. The observations were taken on an Olsen compression testing machine of 20,000 lb. capacity, the machine being sensitive to one pound. The compression was read from an Olsen compression micrometer, reading to 1/10,000 part of an inch. Observations were taken every hundred pounds.

Cube No.

1. Neat magnesium oxychlorid cement.
2. 1 vol. magnesium oxychlorid cement, 1 vol. Ottawa sand.
3. Sample Nephi laboratory plaster without accelerator.
4. Sample Nephi laboratory plaster without accelerator.
5. Nephi Dental (impression).
6. French's bulk.
7. Dental (Raymond Impact).

The modulus of elasticity and the crushing strengths of the samples were as follows:

Cube No.	Modulus of elasticity.	Crushing strength per sq. inch.
1.	206,000 lb.	3875 lb.
2.	294,000 "	4250 "
3.	130,000 "	750 "
4.	160,000 "	850 "
5.	115,000 "	900 "
6.	150,000 "	875 "
7.	90,000 "	325 "

Comparative Chemical Analyses of Plasters Used.

	CaO.	SO_3.	H_2O.	CO_2.
S. S. White (French's)	38.64	52.50	7.21	1.50
Nephi Collector (Laboratory), no accelerator	38.68	53.00	6.16	1.34
Nephi Dental (Impression)	38.64	53.02	6.72	1.26
Impact product	38.64	52.50	6.62	1.50

TEST OF VOLUME CHANGE IN SETTING OF MAGNESIUM CEMENT WHEN ADMIXED WITH AN EVEN VOLUME OF STANDARD OTTAWA SAND.

The measurements were made with a screw dividing engine with microscope attachment, used in the determination of volume changes in waxes, which experiments are not to be reported here, and similar to a device used for wax-measuring purposes by Dr. Weston A. Price, and described in an article published in the DENTAL COSMOS for March 1911.

In preparing the specimen, a glass tube of about $1\frac{1}{4}$ in. diameter was ground nearly square on the ends, one end being closed with a glass plate and the tube carefully filled level full; a second glass plate was used to insure an even surface at the top. This second plate was removed before setting had begun.

The length of the tube was measured at eight points around the circumference, the tube removed, and the length of the casting at the same eight points measured. The mean length of the tube was found to be 14.6962 cm., that of the casting 14.6500 cm. The linear shrinkage was, therefore, 0.0462 cm., or about 0.31 per cent., or about equal in magnitude, but opposite in direction, to the linear change in setting Nephi Dental plaster of 6 to 10 water-plaster ratio.

Inasmuch as the writer has referred to a shrinkage in the cooling of modeling compounds for impression purposes, there will be included in this article the results and method of determining the volume change in Kerr's impression compound. For, as heretofore noted by the writer under the heading "Magnesium Cement," the shrinkage in impression compounds, added to the shrinkage in magnesium cement, may be too great to admit of the use of modeling compounds for impression purposes for vulcanite work—limiting the use of the impression compounds, therefore, to the production of such casts as may be required for preservation, for orthodontic or students' technic work, etc. It is therefore of possible interest to report experiments with an impression compound, in order to show that the contractile element was determined in a sufficiently accurate way. For this purpose, Kerr's modeling compound was chosen, and the volumetric method was used in preference to the screw dividing engine, as the distortion of the compound at high temperatures was such as to preclude its use in determining the changes which would occur at from 120° to 125° F., at which temperatures the manufacturer advocates softening the material prior to using it for impression purposes. A lack of time precluded the possibility of testing other impression compounds, though the market may afford some which present a lower degree of contraction in the cooling process.

Device for Testing Volume Changes of Investment Compounds at Varying Temperatures.

As suggesting a possible means for determining volume changes in plaster under vulcanizing temperatures, and for the purpose of determining the shrinkage factor in investment compounds, the following description of a device constructed for such purposes is given, together with some curves illustrating the shrinkage of neat plaster subjected to vulcanizing temperature but with absence of moisture. These experiments possess no particular value with reference to the tests heretofore reported, since the actual conditions of vulcanizing were not reproduced in regard to moisture; if these conditions were reproduced, slight expansion might be expected, in view of the moisture, rather than the contraction herein reported, which is due to the dehydration of the plaster. However, these experiments show that Dr. Prothero has given dangerous advice in recommending the dry heating of flasks preparatory to packing; for, as shown, calcination of the plaster is fairly rapid after the very low temperature of 212° F. is reached, the casts contracting markedly at somewhat high temperatures.

The description of the testing device is given in order to suggest to the inventive possible modifications which

might be made in order that vulcanizing conditions might be met. It is included here more especially for the benefit of those who are interested in manufacturing investment compounds, since the device as constructed is capable of producing temperatures up to the fusing-point of gold, and recording at the same time the volume changes in the investment material used. The writer was unable to complete a series of experiments with these investment compounds, though a report may be made at a later date.

Change of Volume of Plaster with Temperature.

The changes in length which the plaster cylinders underwent on being heated to 320° F. were measured by using the optical lever already described, and heating the specimen to be tested in an electric furnace. The arrangement of the apparatus is shown in Fig. 4. The small temperature coefficient of the fused quartz renders it unnecessary to make corrections for its change of length with temperature.

FIG. 4.

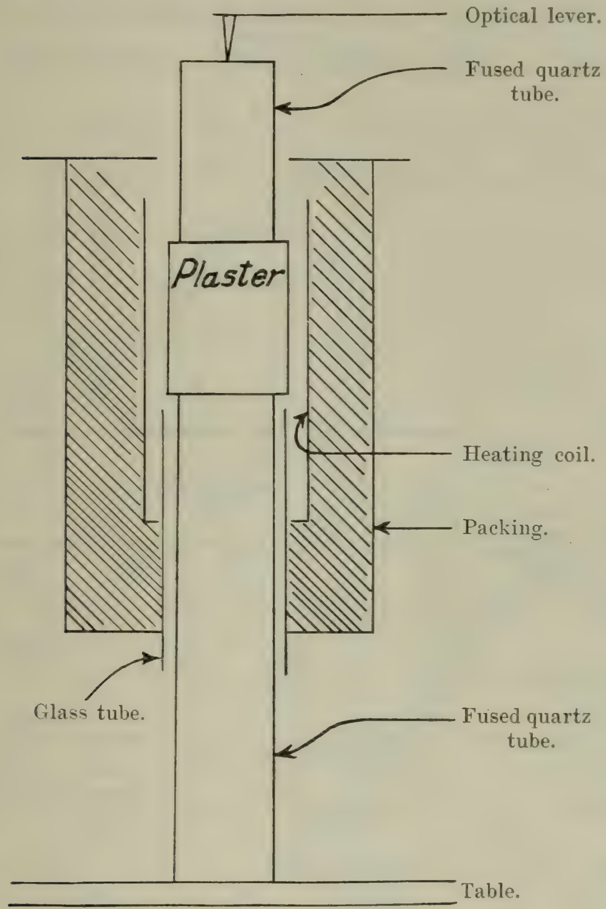
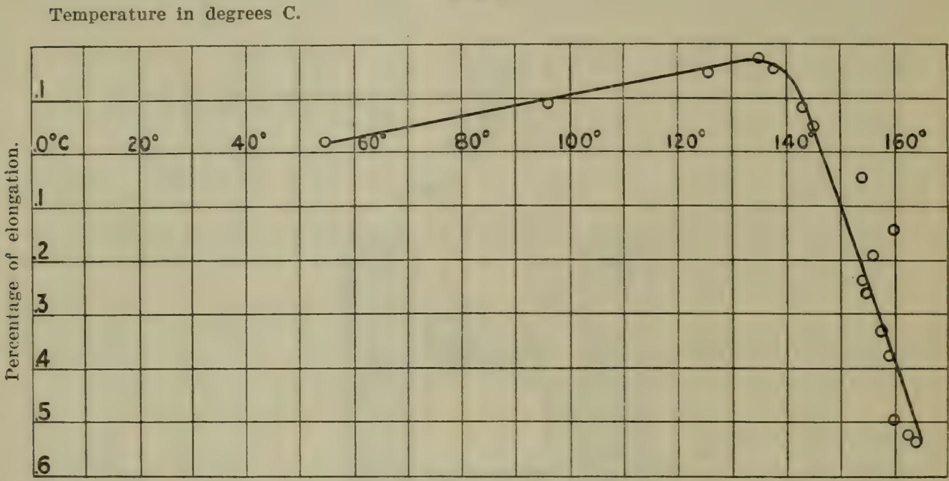


Diagram of electric furnace section. (Not to scale.)

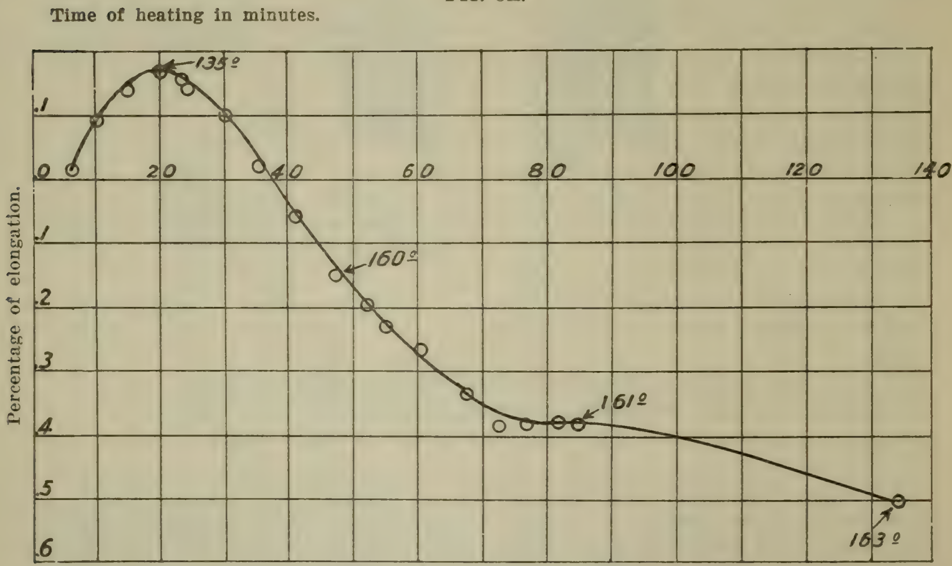
Care was taken that the quartz tube should not touch the furnace at any point. The results of the measurements made in this part of the work are illustrated by the curves in Fig. 5 and Fig. 5A.

FIG. 5.



Change of length with temperature of furnace.

FIG. 5A.



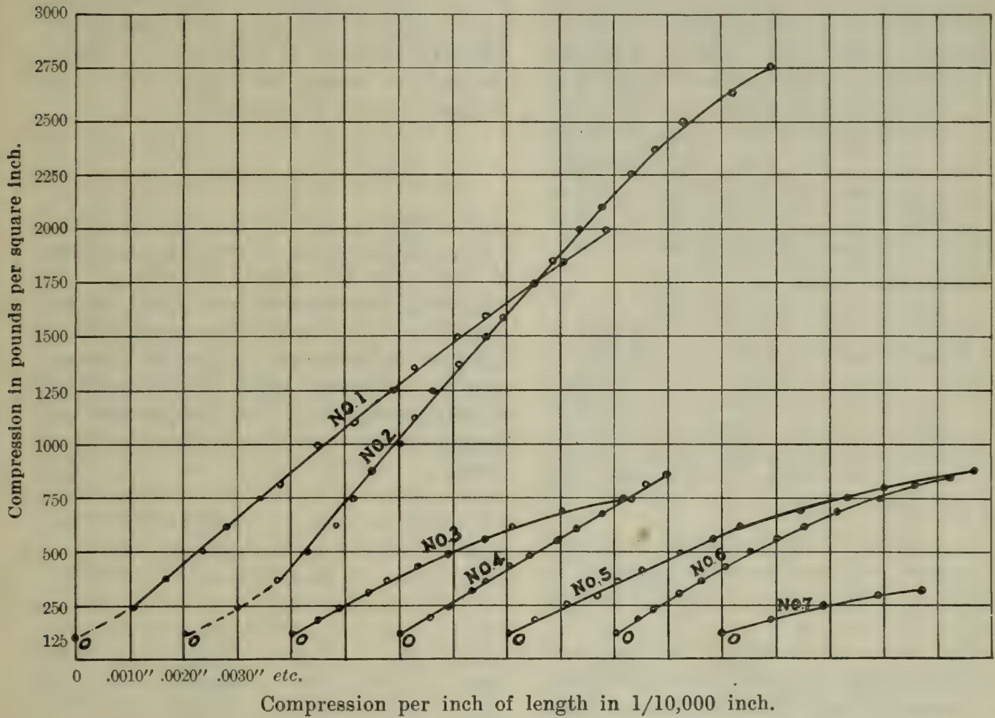
There was an expansion which continued until the furnace temperature was somewhat above 212° F., when a contraction began, which continued as long as the temperature continued to rise. When the temperature was kept between 310° and 320° F. for 40 minutes, the contraction ceased, but began again as soon as the temperature rose beyond the point to which the

plaster had been previously heated. This contraction amounted to about 7/10 per cent. from the beginning to 320° F.

(*d*) With wax and filled with water at 26.5° C.: 47.5355 gm.

(*e*) After heating to 51° C. and cooling to 25.5° C.: 47.0943 gm.

FIG. 6.



CURVE—	Modulus of elasticity.	Crushing strength.
No. 1. Neat magnesia cement.	No. 1. 206,000 lb.	.... 3875 lb. sq. in.
" 2. 1 vol. magn. cement; 1 vol. Ott. sand.	" 2. 294,000 "	.... 4250 "
" 3. Nephi (collector) without accelerator. Laboratory plaster.	" 3. 130,000 "	.... 750 "
" 4. Nephi (collector) without accelerator.	" 4. 160,000 "	.... 850 "
" 5. Nephi Dental.	" 5. 115,000 "	.... 900 "
" 6. French Bulk.	" 6. 150,000 "	.... 875 "
" 7. Dental Raymond. (Impact.)	" 7. 90,000 "	.... 325 "

Volume Change of Kerr Red Impression Compound.

(Volumetric method used.)

A small specific gravity bottle was weighed under the following conditions:

(*a*) Empty and dry: 15.7795 gm.

(*b*) Filled with water at 25.5° C.: 43.9788 gm.

(*c*) Dry with wax introduced: 27.2246 gm.

(*f*) Filled with wax and water at 15.5° C.: 47.6715 gm.

From these data, the percentage of volume expansion was calculated as follows: The weight of water filling the bottle at 25.5° was 28.1993 gm., and since at 25.5° one gram of water occupies 1.00307 cc., the volume of the bottle at this temperature was 28.2859 cc. The

volume of the water added when the wax was in the bottle was 20.3859 cc. The volume of the compound was therefore 7.900 cc. at 26.5° C.

On heating to 51° C. the bottle lost in weight by water expelled 0.4412 gm. This loss was due in part to the expansion of the wax, and in part to the expansion of the water itself. Furthermore, it is less than it would have been had there been no expansion of the glass. Since the changes in the volumes of the water and of the glass are accurately known, they may be calculated, and thus the effect due to the wax alone determined. This calculation is as follows:

Volume of bottle at 51° C. (Coef. of exp. 0.000024 per degree)	28.3048
Volume of bottle at 26.5° C.	28.2859
Increase in volume of bottle	.0169 cc.

Increase in volume of 1 gm. of water between 26.5° and 51° equals 0.0091. Increase in volume of 20.310 gm. water between 26.5 and 51° equals 0.1848 cc.

The net effect due to change in volume of water and bottle was expulsion of 0.1679 cc. H_2O at 51°, or of 0.1650 gm. H_2O.

The total loss in weight due to heating from 26.5° to 51° was 0.4412 gm., and substracting 0.1650 gm. gives 0.2762 gm. water at 51° due to expansion of wax. This at 51° occupied 0.2801 cc. which is the increase in volume of the wax between 26.5° and 51°, and this divided by the volume at 26.5° gives the percentage of increase in volume or $\frac{0.2801}{7.900}$ = 0.0354 or 3.54 per cent. change of volume (linear change 1.18 per cent.) between 51° C. (123.8° F.) and 26.5° C. (79.7° F.).

When chilled in tap water of 15.5° C. (59.9° F.), the percentage volume contraction was found to be 4.74 (linear change 1.58 per cent.).

The coefficient of expansion per degree C. for the two cases is—

Range.	Vol. coef.	Linear coef.
51°—26.5°	.00142	.00047
51°—15.5°	.00133	.00044

—which indicates that the expansion is more rapid at high temperatures than at low ones.

It must be remembered that the linear contraction of any substance is one-third of the volume contraction; hence, in the volume change noted as 3.54 per cent. and 4.74 per cent. observed under different degrees of cooling, the linear contraction would be respectively 1.18 per cent. and 1.58 per cent.

ADDITIONAL TESTS OF PLASTER.

In order to further compare the general physical effects of varying quantities of water to a constant of plaster, the following experiments were made, which seem to justify the inference drawn from the first experiments, *i.e.* that the expansion is in inverse ratio to the quantity of water used, but that the strength of the plaster is lessened in direct proportion:

Lot No.	H_2O cc.	Set: min.	Coef. expansion.	Mean.
54	25	3.5	.00391	.00398
55	25	3.5	.00406	
56	27.5	3.5	.00367	.00354
57	27.5	3.5	.00342	
58	30	4.5	.00303	.00298
59	30	4	.00293	
60	32.5	5	.00274	.00276
61	32.5	4	.00279	
62	35	5	.00274	
63	37.5	6	.00269	
64	40	6	.00254	
65	50	6	.00215	
66	50	6	.00225	
67	40*	2	.00235	

* Contained 1 per cent. NaCl.

Compare 64–67 (practically the same). Such decrease in expansion due to workmanship, No. 67 setting so fast as to have gotten a partial expansion before adjustment.

Comparison of compression tests on Nephi laboratory plaster, using varying quantities of water to a constant of plaster:

In 45 minutes after setting.

Cube No.	Amount of plaster.	Water cc.	Breaking strength per sq. inch.
2...	100 grams	50	1325 lb.
4...	100 "	55	1300 "
6...	100 "	60	1100 "
8...	100 "	75	1050 "
10...	100 "	70	900 "
12...	100 "	75	800 "
14...	100 "	80	750 "

After 24 hours.

Cube No.	Amount of plaster.	Water cc.	Breaking strength per sq. inch.
1...	100 grams	50	1100 lb.
3...	100 "	55	1100 "
5...	100 "	60	1000 "
7...	100 "	65	850 "
9...	100 "	70	800 "
11...	100 "	75	625 "
13...	100 "	80	575 "

Referring to previous experiments where similar quantities of water were used and the same constant of plaster, the tensile strength shows the same relative physical inferiority of the higher water mixtures. While only 45-minute briquet tests were made, some previous experiments also showed that the 24-hour test pieces lost rather than gained strength, the same holding true as to compression tests, indicating that, in the particular plaster used, there is nothing to be gained by deferring the flasking operation for more than one hour after the mixture is made. To wait for several days before vulcanizing on the cast is to invite undue warpage changes; at least this has been reported by some observers.

CONCLUSIONS.

Among the deductions to be made from the foregoing experiments and comments, are the following:

The water and not the saline catalyzer is the most potent factor in the control of expansion. Using saline catalyzers and excess water, however, induces physical weaknesses in a marked degree.

The use of finely powdered set plaster as a catalyzer in impression plaster is far preferable to using saline catalyzers, in that the expansion may be controlled to the same degree by thin mixing, and the surface hardness and all other physical factors are incomparably better.

For casts or for flasking, it is not desirable that reground plaster be used, even though made from high-class gypsum, in that it presents physical weaknesses in such a marked degree as to invite distortion under the pressure imposed in the flasking operation, which would more than offset the desirable low expansion induced through the excessive amount of water required to bring the material to a workable consistence, and therefore, of the two we should choose the lesser evil.

The practice of dry-heating flasks preparatory to packing is hazardous and should be done only in connection with a water or sand bath, and, if the latter be used, a temperature indicator should also be employed, otherwise the heat may be carried to the calcination temperature with consequent great contractile change in the cast and doubtless without subsequent compensation when the flask is immersed, since the plaster is then under great pressure.

The supply houses should demand of the manufacturer a report of the physical tests of the product being supplied, these reports to be made available to the dentist, first for him to determine that the product is sufficiently high-testing for dental uses, and secondly to compel definite desirable methods of production upon the part of the manufacturer to secure in all cases a uniformly high-testing product.

For high-class vulcanizing work, the use of magnesia cement presents splendid possibilities, the tests as given warranting at least a careful trial. Doubtless those interested may make other deductions and find points for criticism, and, since the writer believes firmly in the adage that "There is wisdom in a multitude of counsel," both suggestions and criticisms are most cheerfully invited.

In connection with the experiments, the writer wishes to acknowledge the very helpful assistance of Dr. A. A. Knowlton, of the department of physics, University of Utah, and the courtesy of that institution in allowing the use of its laboratories and apparatus.

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

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(Continued from page 1048.)

(VI.)

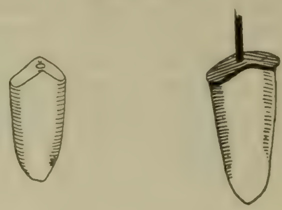
CHAPTER IX.—Crown Work.

TUBE TEETH CROWNS WITHOUT COLLARS.

The unbanded or collarless crown has always been a favorite one, and its growing popularity is evinced by the rapid increase in number of detached-post crowns, most of which are used unbanded. Doubtless the popularity of the latter is partly due to the limited demand which they make upon the skill of the operator, to the large selection afforded—indeed, one might say the too large selection—and possibly also in some cases to their cheapness. There are, however, very many conscientious and skilful operators to whom some of these advantages would not appeal, and who maintain that the strength derived from banding roots and the additional anchorage thus obtained is neutralized by increased difficulty in preserving a healthy condition of the gum and pericemental membrane, and for these workers the unbanded crown provides all the advantages which they consider necessary. There are also many cases which from various causes, such as caries or fracture of a portion of a root, make the accurate fitting of a band impossible. These cases may be successfully dealt with by means of what is usually known as the plate and dowel or the unbanded crown.

The preparation of the root with regard to its surface differs from that followed in connection with the banded crown, and should be carried out in the manner shown in Fig. 107, A, first described by Dr. C. M. Richmond, and known as the New Richmond crown. The advantage of this method of shaping lies in the resistance offered to the forward thrust of the crown in the case of the front teeth, to which this method of preparation is alone suitable, resulting as it does in diminishing the strain put upon the post, and transferring part of it to the lingual surface of the root, thus minimizing the danger of fracture. This method of preparation is not suitable where decay has extended below the gum, unless it is confined to the palatal or labial surfaces only. The cutting-down of the root should extend to about one sixty-fourth of an inch below the margin on the lingual surface and slightly deeper on the labial one, which should be shaped to follow the outline of the gum margin, so that the joint may be perfectly hidden. In this

Fig. 107.



A B

A, Manner of shaping root for unbanded crown. B, Post and cap in position on root.

method the enamel should not be removed, and so the preparation should be made by means of small stones, and not with a root-facer, such as the Ottolengui, as thereby there is danger of fracturing the ring of enamel surrounding the root. Assuming that the case about to be described is that of a central incisor, the canal should be reamed out to a No. 2 size Peeso reamer—which is exactly the size of No. 4 wire—and after the apex has been sealed a tapered post should be fitted to the canal, and if need be, bent to the line of the cutting edge of the adjoining teeth, or this may be done after the impression has been cast. A piece of pure gold No. 28 to 32 gage should now be cut to conform with, but extend slightly over, the surface of the root, to which it should be burnished. It should then be perforated at the point indicated by the depression, which shows the position of the canal. The end of the post should next be grasped with the roughing pliers, and the point forced through the small opening made in the cap, until the post is home into place (Fig. 107, B). A small piece of temporary gutta-percha stopping should next be molded over the cap and around the post, and post and gutta-percha grasped with pliers and carefully removed; or, if sufficient care be taken, the post and cap may be removed without resorting to the use of gutta-percha, and in consequence the necessity for investing may be avoided. Cap and post should next be united by means of a small piece of solder, sufficient only to tack them together, and, after soldering, once more placed on the root and burnished to fit it accurately, while any surplus gold covering the root should be trimmed off. An impression of the cap and post, along with one or more of the teeth on each side, should now be taken, but a bite is rarely necessary. A suitable tooth should then be selected and shaped up and ground to fit the cap in the manner previously described, or a porcelain rod may be used if a satisfactory tooth cannot be obtained. Another method by which the cap is dispensed with and only a post employed is as follows: Prepare the root in the manner already described, and fit a post to the canal, when an impression should be taken and a model obtained; next the crown should be fitted to it, and the post afterward cemented to place, when the crown may be fine-fitted to the root. The subsequent steps of finishing have been already dealt with. In place of an ordinary post, a How screw, size B, may be used in the manner described in connection with these instruments.

An alternative method is to dispense with a model altogether, and shape up the crown directly to the root. This may be done in the following manner: The root having been prepared as already described, the post should be fitted, adjusted, and fixed to place, when a suitable tube tooth should be selected and rough-fitted, care being taken to leave it sufficiently large for fine-fitting to the root in the manner described in connection with the fitting of a front tooth crown to a model; but as no preliminary trimming of the approximal surface of the adjoining teeth is here possible, care must be observed to first fit the tooth tightly into the space. In order to mark the point of contact between the tooth and cap, small disks of articulating paper may be employed, or vermilion paint used. The advantages gained by the post acting as a guide to accurate fitting shortens the operation and makes it easier.

Tube posts. Where it is deemed necessary to employ a tube post instead of a solid one, this may be done as mentioned in Chapter VII, page 939.

Unbanded bicuspids. The method of procedure in connection with the application of a bicuspid crown to an unbanded root differs from that necessary in dealing with the incisors, as the former does not permit of the root surface being shaped in the same way, nor is there necessity for doing so, seeing that the thrust is a lateral one and not directed forward as in the case of incisors; therefore the ordinary saddle shape may be given to the root, as

greater strength is thereby obtained (Fig. 108). Should there be two canals, as is usually the case in the upper first bicuspid, a post should be fitted to each. (See description given in Chapter IV, with Fig. 29, at page 692 of June Cosmos.)

Unbanded upper molars. Here again the general method of procedure closely approximates to that followed in dealing with the bicuspids, though there are necessarily differences in the matter of detail. The palatal root, being the longest and strongest, is best suited for the purpose of carrying the post, which may be bent as in Fig. 109. A better plan, however, is to fit a post to the

Fig. 108.

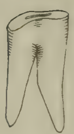


Fig. 109.

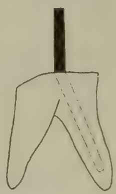


Fig. 108: Bicuspid root prepared for cap.
Fig. 109: Shows manner of bending post.

palatal canal and a separate one to carry the crown, following the method described on page 691 of June Cosmos, and taking advantage of reinforced anchorage where this is necessary by shaping the pulp chamber as therein described, or by utilizing the canal of one of the buccal roots. While the bite is usually open enough to allow of sufficient strength of porcelain for both the first and second molars, the third molars, both upper and lower, can rarely be relied upon to afford a sufficient thickness for strength, and an all-gold crown is most suitable for them.

CROWNING MOLAR ROOTS WHICH HAVE BEEN SEPARATED BY DECAY AT THEIR BIFURCATION.

While it is unusual to meet with this class of case where one or more of the roots can be made serviceable for crowning, they are not very uncommon. Hitherto the only method suggested whereby such roots could be made useful has been to cap and band the individual roots, join them together, and on this foundation to construct a gold crown, or to treat them as individual gold crowns. No attempt, as far as the writer is aware, has been made to describe a satisfactory method of all-porcelain crown substitution to meet those cases. This doubtless has been due to the supposed unsuitability for the purpose of the various forms of porcelain crowns, though there appears to be no reason why some of these fused on to a platinum base should not have been suggested. Whatever the reasons may be for not doing so, they certainly could not apply to tube teeth, as experience has proved that these are well suited for this purpose, both with regard to adaptability and strength, while they have all the advantages in appearance which porcelain possesses. Ordinarily, the lower molars yield better results than do the upper ones, as the difficulties with regard to the latter are increased, owing to the presence of three instead of two roots. The method of application differs from that of a tube molar crown in only a few details, and consists in banding and capping the individual roots, where these are capable of taking their share in supporting a crown; or where one root only affords sufficient strength, in employing a cantilever crown.

In the case of a lower molar, after the caps and bands have been made, as long a post as is practicable should be fitted to the posterior canal, which usually affords the best anchorage, and soldered to the caps in the usual way. It will be frequently found that the anterior root permits of only a very short post, or even none at all, but such anchorage as may be available should be fully utilized. After soldering, the caps should once more be placed upon the roots, and the accuracy of their fitting tested, after which a small plaster impression should be taken of them in position, when these may be replaced in

the impression if they do not come away in it. The impression should then be cast in investment, and the plaster removed after the latter has hardened; next the caps should be united by means of solder, and their surface strengthened in this way, and if desired by a piece of plate also. A post to carry the tube tooth should be soldered centrally between the united surfaces of the caps for the purpose of carrying the tube crown (Fig. 110), which should be fitted to the cap and to the bite in the usual manner.

FIG. 110.

Post in position to carry tube crown.

CROWNING LOOSE TEETH.

The first thought that will occur to the reader will doubtless be that loose roots should not be crowned, and this is doubtless true in the majority of cases; but circumstances sometimes arise which make this operation not only highly desirable, but necessary, the results being that a root thus treated often has a long period of usefulness.

The expression "loose tooth" is one capable of wide interpretation, and no hard-and-fast rule can be laid down with regard to the degree of looseness which will warrant crowning. Consequently, the choice of such cases as are likely to prove successful is one which each operator must decide for himself, and in doing so many important factors will call for consideration, such as the age of the patient, the cause of the loosening, the probability or otherwise of the tooth responding favorably to treatment, the amount of support obtainable—usually a necessary adjunct to success—and lastly the skill in carrying out the various steps in the operation.

Ordinarily the joining together of two or more loose roots increases their individual chance of usefulness, and favors such therapeutic measures as are adopted with a view to this end, and these results also necessarily follow when a loose root is anchored to a firm one, with the result that such loose roots usually attain a remarkable degree of firmness, owing to the consolidation of old bone and deposition of new. The principle may be further extended to include a large and important class of cases, in which a number of loose teeth may be splinted together to afford a foundation for one or more tube teeth.*

For descriptive purposes, then, the two following types of cases will be selected: (1) That in which two or more loose teeth or roots are joined together; and (2) that in which a loose tooth or root is anchored to a firmly implanted one, either by means of a crown, bar, or inlay.

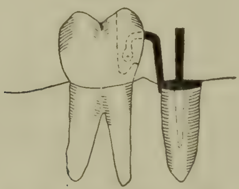
With regard to the first class, assuming the case to be that of a loose second bicuspid which is to be joined to a loose molar, the caps and posts should be made as for single crowns, adjusted to place, and a small plaster impression taken in the usual way. This should be cast in investment material in order that the parts may be maintained in their exact relationship. After they have been soldered together, they should be replaced on the roots in order to make certain that their relationship has not been disturbed. The posts should next be cut down until they just clear the opposing teeth in occlusion, when a small model and bite may be taken, and the crowns fitted and shaped in the usual way, the final touches being given at the chair side.

With regard to the second class, where a loose root is to be anchored to a firmly implanted tooth, let us assume that the case is again that of a loose upper second bicuspid root. In the crown and approximal surface of the molar which is to furnish the supplementary anchorage, a suitable cavity should be

* This subject will be dealt with in a subsequent series of papers in connection with plate and bridge work.

prepared for the reception of an anchorage bar or a gold inlay. Not infrequently this will call for devitalization of the molar pulp, but very often a filling or cavity is present, and when this is the case advantage should be taken of it. Fig. 111 shows a method of attachment which will be found suit-

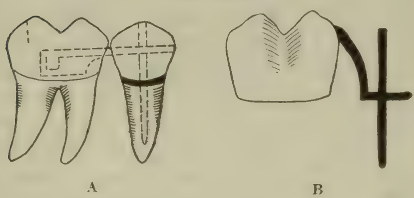
FIG. 111.



Shows method of attachment by supplementary post into filling.

able for most cases, and consists in soldering a supplementary post size No. 4 to the edge of the cap and band, and bending it to fit into the cavity of the tooth. For this purpose a model and bite will be necessary to enable the anchorage wire or bar to be fitted, and this may be soldered to the cap while

FIG. 112.



A, Tube tooth with horizontal tube bored to carry supplementary bar. B, Supplementary post soldered on to crown.

it is being thickened up along with the central post for carrying the crown. The tooth afterward may be fitted to the cap in the ordinary way, a groove being cut in its approximal surface for the accommodation of the bar, which may be of half-round instead of round wire; or the crown may be fitted first to the cap and a groove then cut in its approximal surface, into which a round or half-round wire may be fitted and afterward soldered to the cap. Or a suitable tube tooth should be fitted to the cap and band in the usual way, and a supplementary horizontal tube drilled at right angles to the perpendicular post to carry the supplementary anchorage bar (Fig. 112, A). The supplementary or firm anchorage tooth may also require to be crowned (Fig. 112, B), either by means of an all-gold or a tube crown; in either case their union should be carried as near their occlusal surface as is consistent with sufficient strength. By this means the interproximal space will be least interfered with.

THE APPLCATION OF A PORCELAIN SHELL CROWN TO A TOOTH WITH A LIVING PULP.

While the majority of practitioners favor devitalization of the pulp in all but a very limited class of cases, there are some who for reasons which they consider good prefer to conserve its vitality, particularly in the case of the incisors, both upper and lower, whenever it is practicable to do so. The reasons advanced for preserving vitality need not be fully entered into here, but that it is sometimes advisable and indeed necessary to do so is beyond dispute. Among the most common cases which require this treatment are certain forms of malformation of the crowns of incisors, such as deficiency of the enamel or extensive abrasion, partial or complete calcification of the pulp, whereby its devitalization and subsequent removal might be rendered difficult or impossible without the risk of perforation. The age or physical condition of the patient may also be an important factor in deciding against any attempt being made which would involve possible pain or tend to prolong the operation; also certain cases of malformation of the root which might preclude the employment of a post. Quite a number of methods have been suggested for treating such cases, and these consist mostly in applying the principle of the jacket or telescope

crown in combination with a porcelain facing. But all of these plans are open to certain objections either on account of lack of strength, excessive bulk, unsightliness, or difficulty of construction, and most combine one or more of these objectionable features. The method of applying a jacket crown with a porcelain face, the incisive edge of which is strengthened by means of clasp gold and solder with a view to protecting the porcelain, is unsightly, unnecessarily bulky, and not much superior in point of appearance to that most objectionable creation, an all-gold crown. If the protection of the incisive edge of the porcelain in the manner described is dispensed with, there is danger of fracture. The application of this form of crown has recently received a considerable amount of attention, and has not a few advocates. The manner of its construction is usually as follows: The remaining natural crown is shaped-up to admit of the accurate adaptation of a platinum jacket or cap of No. 60 foil, burnished to it, or of No. 36 soft platinum plate employed in the same way, or a die may be used to swage it. A very thin facing is ground to proper adjustment, and the pins soldered to the cap, when the crown is completed by fusing a sufficient quantity of body over it. Obviously such a form of crown is lacking in the first essential, namely, strength—because, as has been already pointed out, fused porcelain, even when supported by a platinum shell, is much too weak. In order to minimize this, the use of high-fusing body is suggested, and doubtless, in the hands of the expert, this may yield good results in certain selected cases, but for those who have little experience of porcelain work, the method is unlikely to afford the results looked for. There remains, too, the question of time, and as the methods spoken of call for more than an ordinary amount of this, a simpler and better plan will doubtless commend itself. This we have in the use of the tube tooth, which calls for no special skill beyond that required in ordinary prosthetic work. It is proposed, then, to consider some of the methods wherein the employment of these teeth has been proved to yield highly satisfactory results. In the case, say, of a central incisor the labial surface of which is extensively denuded of enamel, the crown of the tooth should be shaped up as in Fig. 113, the preparation being carried to the gum margin or a little beyond it, and following the festoon of the gum. All the enamel should be removed by means of carborundum wheels and points. This operation may be carried out with little or no pain in the following manner, which, it may be remarked in passing, is also an invaluable method, with some slight modifications, of opening into an acutely inflamed pulp.

FIG. 113.

Tooth prepared to receive porcelain shell crown.

Place the tube of the saliva ejector in the mouth, and have the assistant direct the stream of water continuously upon the tooth, commencing with a syringeful, about 60–70 degrees, and quickly change to one about 10 degrees lower and follow with one of ice-cold water, continuing with this during the shaping-up process. In this manner all pain is avoided.

It is not proposed here to enter into further details with regard to the shaping-up process. This is familiar to those in touch with modern methods of crown work, and so the method of procedure in connection with fitting and shaping a crown from a tube tooth or section of porcelain rod will now be dealt with. The general plan is as follows: If the tooth is an isolated one then no model is necessary, as the crown may be fitted directly to the shaped-up tooth. Having selected a suitable tooth

of the right color and of ample size, proceed to enlarge the tube at its base, and in order to do so employ the coarsest grit of carborundum point mounted in a porte-polisher. Place the tooth in a rubber cup filled with water, base upward, and, with the engine run at a high speed (see Chapter VIII, page 1034), hollow out the base (Fig. 114). Ordinarily it will require to be shaped as in Fig. 114, so a rotary motion should be used to deepen the recess. This takes only a few minutes; in fact, the average time taken to hollow out as shown in Fig. 114, D, is five minutes. The shaping up and polishing, however, may take anywhere from twenty minutes to an hour. The latter should be ample even when the largest size of tube tooth or porcelain rod is employed. If need be, small wheels may be used to enlarge the recess still further. The eye alone will serve to gage very nearly the amount which should be ground out. The crown may then be tried on and points of contact noted and ground off until an accurate fit is obtained. To facilitate this, paint may be used to mark the points of contact. Having obtained an accurate fit, next proceed to shape up the tooth to the desired size and form in the manner described in Chapter VIII. Another method is to take an impression, fit the crown to it, and fine-fit at the chair side. The strength of the anchorage of the crown to the tooth and the strength of porcelain thus obtained is greatly in excess of that got by any of the other methods described, as the ground recess affords the maximum amount of hold for the cement, while the porcelain, being manufactured, greatly exceeds in strength that of the fused article. In consequence a much thinner porcelain shell may be used. Moreover, the final shaping-up of any or all of the surfaces of the crown may be done after it is set on the tooth, and the polishing carried out by means of the smoothing wheels previously spoken of and felt or moosehide buffs, with pumice and water.

As many cases which require the application of a crown to a tooth with a living pulp occur in patients at about middle life, when there is usually a considerable amount of calcification of the pulp, another method may be adopted which yields excellent results, and the method of procedure is as follows: If a single tooth only requires to be crowned, that portion of it standing above the level of the gum should be cut down to within about one-sixteenth of an inch of the gum on the lingual, and level with it on the labial surface, the periphery of the root trimmed, and a band and cap formed in the usual way, the former being made of 22-karat platinized gold No. 30 gage. The post should be soldered as near the front as possible for uppers, in order to obtain the maximum strength of porcelain (Fig. 115), and this may be done by using a tube tooth or section of porcelain rod of sufficient size to cover the cap, at the same time allowing the post to be placed where it will least affect the strength of the crown. Usually this will be near the labio-cervical border. Even a very short pin will permit of ample anchorage of the crown to the cap. Indeed, the rough surface left by grinding the base gives in itself remarkable adhesion, especially when the gold is also roughened. Attention at this point is once more drawn to the fact that the better the fit of porcelain to cap and of post to tube, the more secure the attachment. The statement so persistently made by so many writers that a considerable body of cement adds strength is entirely erroneous, is contrary to the facts of experience, and is also negatived by the argument—undoubtedly a sound one applied to inlays—wherein it is maintained that the smaller the body of cementing material, the more secure is the attachment. In these cases where two or more adjoining teeth require crowning at the same time, greater strength is obtained when these are shaped up from a double-tubed porcelain rod (Fig. 116) than when individual crowns are employed.

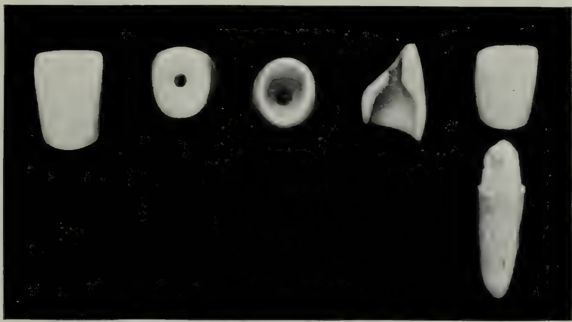
The application of tube crowns in cases of extensive abrasion and erosion calls for fuller consideration, as these cases are of frequent occurrence. The

causes which give rise to this condition are numerous, and among the most common is faulty occlusion resulting from early malposition of the teeth, which condition may arise at any time after full eruption. When this occurs it is nearly always associated with an edge-to-edge bite, and tends to become aggravated with advancing years. The number of teeth involved, also the character and extent of the wearing-down process, is subject to wide variation, and is hastened by loss of the grinding teeth; as a matter of fact this is one of the most common exciting causes of abrasion and of the conversion of a normal bite into an edge-to-edge one. The etiology, however, need not be considered further, but consideration given to the subject of treatment.

When the conditions are similar to those dealt with in connection with the crowning of living teeth, the methods therein described will be found applicable, but when it is possible to devitalize the pulp and utilize the root only for the purpose of obtaining anchorage, this should be done. Usually the bite requires to be opened, either by crowning, crowning and bridging, by means of plates, or by a combination of these methods in connection with the grinding teeth, in order to obtain sufficient length and strength of porcelain for the incisor crowns.

The number of crowns which require to be in occlusion in order to maintain a sufficiently open bite, a sufficient grinding surface, and at the same time afford a reasonable prospect of maintaining these conditions for a number of years, will depend on a variety of circumstances, such as the age of the patient, the nature of the teeth, and whether the roots are long and firmly implanted. And it is surprising what permanence may be obtained in this way

FIG. 114.



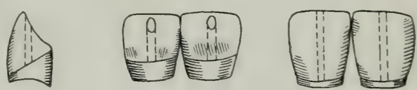
A B C D E

A, Central incisor tube tooth. B, View of base. C, Base hollowed out. D, Section showing part hollowed out. E, Finished tooth with root.

FIG. 115.

Post soldered anteriorly.

FIG. 116.



A B C

Central incisors formed from double tube rods. A, Approximal surface. B, Lingual surface. C, Labial surface.

by crowning the incisors, canines, and bicuspids alone, without the help of the molars or of plates. Indeed, in many cases the patient refuses to consider wearing the latter, even after being fully warned of the diminished period of usefulness these crowned teeth are likely to afford in consequence of the absence of such a valuable adjunct. Here the condition spoken of is not infrequently made the excuse for employing porcelain-faced crowns strongly reinforced with gold at their incisive edges for the upper teeth, while it is sometimes boldly suggested to use all-gold crowns for the lower incisors, and with far less reason than where devitalization cannot be resorted to, as where this is done ample strength may be obtained by the employment of tube teeth even in the case of a very close bite. Moreover, additional strength may be obtained where two or more crowns are shaped-up from a porcelain rod.

CROWNS WITH EXAGGERATED CONTOUR. CANTILEVER CROWNS.

Cases not infrequently occur in which it is desirable to exaggerate the contour of a crown on one or both of its approximal surfaces, and the necessity for this usually arises from the loss of one or more grinding teeth adjacent to the one which requires crowning. Where the space is too large to be filled by one of the many forms of porcelain crowns the difficulty is generally met by employing an all-gold or porcelain-faced crown, contoured on one or both of its approximal surfaces until it is in contact with the tooth on each side, in order to prevent food from packing down on to the gum, or to prevent the teeth on each side from tilting toward one another. The largest forms of tube teeth and porcelain rods, especially double-tube rod No. 29, are pre-eminently suited to meet such cases, and in a much more satisfactory way than by any other means. The built-up porcelain crown is seldom strong enough, while the length of time necessary for its construction also tells against it, and the all-gold crown is often unsightly. The tube tooth and porcelain rods, on the contrary, may be utilized for such cases in a great variety of ways, and fulfil the necessary requirements both with regard to strength, adaptability, and appearance in a manner which leaves nothing to be desired (Fig. 117).

CROWNING LOWER FRONT TEETH.

While an almost endless variety of methods have been suggested for crowning all the teeth in the upper jaw and the grinding teeth in the lower, there is a remarkable dearth of literature on the subject of crowning the lower incisors and canines; moreover, little provision is afforded for selection in the matter of either fixed or detached-post crowns suitable for this purpose. To judge from the absence of criticism with regard to this deficiency, one would assume that the necessity for crowning these teeth seldom arises. While it is true that one meets with far fewer cases in the lower than in the upper jaw, and that it would be difficult to state with accuracy the proportion which these cases bear to those of the upper incisors, it is probably fairly near the mark to say that the proportion is somewhere about 1 : 6. At all events they are sufficiently numerous to call for more attention than seems to have been given them. Such methods of crowning as have been suggested have been concerned mostly with the use of the banded crown with porcelain face; where the bite is close, it has been boldly suggested to employ all-gold crowns as previously mentioned. As these have been the chief methods suggested, it seems reasonable to suppose that they have been advanced because it has been taken for granted that no other method which would combine the necessary strength with esthetic requirements is available, and in the absence of the tube tooth this fact is undeniable. These, however, meet all requirements either when employed as single crowns or when conditions permit of two or more being shaped-up from a porcelain rod.

The method of employing them is

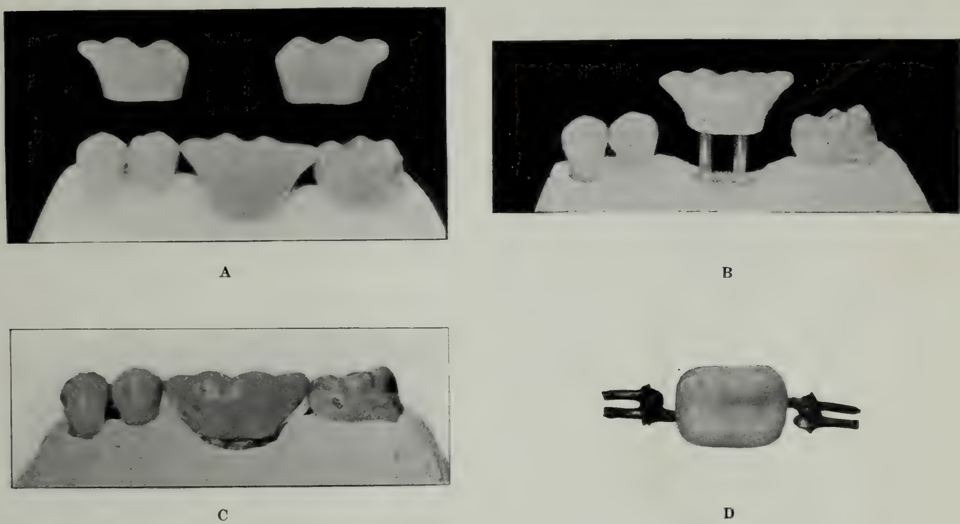
precisely the same as in the case of the upper incisors. With regard to the teeth, these are generally too small in the base to cover a banded root, but when this is the case a suitable one may be readily formed from one of the larger forms of tubed teeth, or from a tube rod, but that part of the post which enters the canal should be tapered from its junction with the crown. The canal should be enlarged with the small special size of Peeso reamer,* and enlarged at its proximal end with No. 1 reamer; by so doing a good long post may be obtained. Owing to the thinness of these roots, it is desirable to employ a full band.

REPAIRING AND REPLACING TUBE CROWNS.

In the chapter dealing with the superiority of the tube tooth, it was pointed out that among the many advantages possessed by tube teeth was the readiness whereby they lend themselves to replacement in the event of fracture. In addition to this, they have the unique advantage of being easily and quickly adapted to any other form of detached-post crown, both with regard to external form and basal anchorage.

Replacement of a fractured crown may be carried out in one of several ways, and without disturbing the anchorage post.* In the case of a front tooth, after all fragments of porcelain and cement have been removed, the most suitable crown should be chosen and fitted directly to the surface of the root or cap, and to do so the first step consists

FIG. 117.



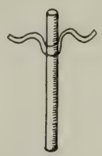
Cantilever or extension crown formed from double tube rod. A, Crown with double extension. B, Method of attachment of crown to cap. C, Double cantilever crown with less porcelain cut away than in A. D, Coronal view of a lower molar formed from double tube rod (extra long antero-posteriorly) to fill large space, such as in A, but where the roots are missing, with bars partly withdrawn showing inlays which are sunk in the porcelain crown.

* See p. 812 of the DENTAL COSMOS for July 1914.

* The replacement of a fractured crown will be rendered still easier if a suitable selection of tube teeth be put upon the market. Meanwhile they have generally to be shaped-up from larger forms or porcelain rods.

in enlarging the tube in the base of the crown to accommodate the post. This may be done as described in "Grinding under water" (page 1047), or a small plaster impression may be taken in the ordinary way, except that a section (Fig. 118) of tubing which will accurately fit the post, and which should have one or two small tags soldered to it, should be placed on the post before the impression or the impression and bite are taken. These tags aid in retaining the tube in the impression while it is being removed, or facilitate its replacement should the impression break or require to be broken during its removal. After the impression has been taken, a suitable length of wire—which may be of brass or German silver, as may also the tubes

Fig. 118.



Tubing with tags soldered to it.

spoken of—should be placed in the tube, which it should absolutely fit, and the impression may then be cast. This will yield a model which will accurately represent the relation of the post to the root, and act as a guide in fitting the crown to the model. Where replacement is required of a section of two or more crowns formed from a double-tubed rod, with the tubes used vertically, a little difficulty may be experienced in removing the broken portions, unless the proper method is followed. This consists in cutting grooves by means of a thin carborundum, diamond, or vulcarbo disk, both labially and lingually, and when these are fairly deep a flat chisel-shaped instrument should be inserted and with a twist the partially divided portions may be broken off. All débris having been removed, a metal tube should be placed over each post and the impression taken as already described. The selection of a suitable rod will present no difficulty with regard to the position of the tube for the posts, for, as already pointed out, these rods are made with the tubes in only seven positions, 1, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, $5\frac{1}{2}$, $6\frac{1}{2}$, and 8 mm. apart, and practically only the last three are used for forming double crowns. Another method, and a simple one, which will meet the requirements of all cases of replacement either of single or double crowns, and particularly when the post or posts are other than round, is to hollow out the base as previously described. This it will be noted can be very quickly done by means of a Butler's point, grinding under water (see Chapter VIII, page 1047), and the time necessary to do so will vary with the amount of porcelain which requires to be removed; it should not exceed one to three minutes. Such a recess allows of an ample bulk of cement, a point persistently advocated by most men, but not favored by the writer for reasons already given.

CONCLUDING REMARKS.

The amount of labor and time necessary for shaping up tube teeth from larger forms of the same and from the special varieties of single and double-tube rods is not so great as would at first appear, and it is hoped that the foregoing description and illustrations have convinced the reader that the claims advanced in favor of tube teeth over other forms of teeth and crowns have been made good. As the subject of crown work has been chiefly under consideration in the foregoing chapter, and as the shaping and fitting of crowns ordinarily calls for more time and skill than other varieties of prosthetic work, it seems desirable before concluding the subject to direct attention to some points which have not yet been considered, and to restate others in order to permit of a more just comparison being made between the tube teeth and other forms for crown work. Such special methods as are necessary in connection with the use of tube teeth in other kinds of

prosthetic work will be dealt with later.

With regard, then, to the question of time, it has been seen that by the employment of the most suitable appliances any tooth may be rapidly shaped-up to form a crown from a tooth sufficiently large to furnish the required amount of material or from a porcelain rod.

The time required for the application of a porcelain crown to a root has always been considered of much importance, and often acts as a deciding factor in the choice of a system for general use or in individual cases, and confirmation with regard to this is offered by the claims advanced in favor of new crown forms in this connection. While the tube crown has other and more important advantages, some of which have been described at length, there is no reason why it need fear comparison even in the matter of time.

Consideration is rarely if ever given to the question of time spent over the selection of a suitable porcelain crown or facing, and if this were done the reader would be surprised to find what this amounts to, and the comparison it bears to the total amount of time spent over the operation. If the selection is a large one, the time usually taken to make a suitable choice is in proportion to the selection offered; while if the selection is a poor one, there is little chance of finding what one requires. On the other hand, it may mean, and very often does mean, sending to a dental depot, which involves loss of time and possible disappointment, as few establishments of this kind carry a stock of all the crowns on the market. Moreover, few if any of these can be adapted to any form of anchorage other than that for which they have been originally designed. The balance, then, is usually much in favor of the tube tooth and porcelain rods, as only a few varieties of these in different shades enable us to meet all cases, because, as we have already seen, the question of size and form are of little moment. The additional time, therefore, which is generally necessary for the selection of other forms of porcelain crowns or facings, may reasonably be deducted from the time taken in shaping up the tube tooth, and a fair margin is ten minutes.

Then, as to the question of skill in its relation to the time mentioned, a moderate amount of experience should suffice to enable the time given in connection with the illustrations, page 1044, Chapter VIII, to be equaled, while the least experienced should easily be able to shape up any crown in ten minutes to conform as nearly to a natural tooth as any form of ready-made crown or facing. Failure to obtain these results will not prove that the time given is not ample, but that the fault is in the inexperience of the operator.

Then, as to the matter of the correct shaping-up of a crown, this does not call for more than an elementary knowledge of the anatomical forms of the teeth, and it is doubtful if there is a better means of acquiring this than by the method suggested.

With regard to the double-tube rods, it will be observed that more than double the time is required to shape up two or more crowns from these than is necessary to form a like number of single crowns, but this arises not from the time spent in grinding a given bulk of porcelain, but from the care required and the necessity for resorting more to the smaller sizes of wheels. And this will be apparent when it is remembered that the relation of the individual crowns to each other has to be kept in view from the first and maintained throughout the shaping-up process, as failure to do this may result in having to commence the work over again. Still the time taken, even if it extends to an hour—and it should not exceed this period—will be made good in subsequent steps, and it is to be noted that the saving of time in the matter of crown selection applies equally in the case of the double-tube rod as with the single-tube rod or tube tooth. The fitting of these double crowns to their base is a matter of little more time than for a single crown, and

an ample allowance for this is one hour, including the time required to resolder a new post in place of the one which, as formerly pointed out, it is generally necessary to remove for the purpose of rough-fitting. It has been pointed out that one of the points of superiority realized with the tube tooth over other forms is the readiness whereby its tube may be altered to conform with the anchorage of any other type of crown, and that in this, as in some other respects, it holds a unique place, as practically all forms of detached-post crowns are suitable only for that form of anchorage for which they are intended—and the *time* necessary to make such alteration fails to be stated here. Experience has proved that a tube tooth may be thus converted to the form of anchorage of an S. S. White or other form of detached-post crown in a few minutes by means of carborundum points; at all events, to such form of anchorage as will enable replacement to be made without sacrificing strength, appearance, or utility.

A knowledge, therefore, of the time necessary for carrying out these alterations is a matter of considerable moment, as it may be much quicker and quite as satisfactory to adapt a tube crown as to send to the nearest depot in the hope of getting what one requires, provided one has not a duplicate crown at hand.

The writer believes that the following comparison regarding the time necessary to select and prepare for setting the crowns named will be found a fair one, and for this purpose a central incisor crown has been chosen. The time required to form and unite together a cap, band, and post is practically the same for all forms of front tooth crowns, and this will not be taken into consideration in making the comparison; moreover, an impression and bite are not always necessary in the case of either a detached-post crown or a tube crown, though a model, and usually a bite, are needed for a gold collar crown with porcelain front, commonly called the Richmond crown:

	S. S. White D. P. Cr. min.	Richmond. min.	Tube. min.
Selection of suitable crown, say	15	15	5
Shaping-up crown, say	0	0	5–15
Fitting crown	20	10	20
Backing, soldering, and cooling	0	45	0
Finishing gold	0	25	10[a]
	35	95	40–50

[a] To smooth and polish tooth.

The balance, then, is in favor of the detached-post crown, which takes less than half the time required for a Richmond crown, while the tube crown takes a few minutes longer than the detached-post crown. While the foregoing is only an approximate estimate of the length of time required, as individual skill varies, the proportion which the individual times bear to one another are very nearly correct.

It will be observed, too, that the tube crown is at present at a disadvantage with regard to insufficiency of selection, and the hope has been expressed that some of the well-known makers will see their way to offer a fair selection of new forms, which would still further reduce the time in favor of the tube tooth. But a still greater saving may be effected by relegating the shaping and fitting to a mechanical assistant,* the operator himself doing only the final finishing at the chair side, and here the tube crown is pre-eminent, because the proper direction of the crown can always be maintained owing to the post accurately fitting the tube. This further favors accuracy of fit as well as strength, as there is no loss of the latter due to substitution of useless cement for porcelain.

* In a busy practice this plan will naturally always be adopted, and this will mean three-quarters of the work being done by mechanical assistants after they have been handed the impression and bite. A further advantage is obtained when a doubt may exist with regard to the most suitable of two closely allied shades, as a crown may be prepared of each and the most suitable one chosen.

Sufficient, then, has been said regarding the matter of time-saving, and it is hoped that the other advantages dealt with, some of which are much more important, will result in commanding the attention they deserve.

There is still another matter in connection with shaping up teeth to which the writer wishes to draw attention before concluding these remarks, namely, the fascination of the work. Those who have had such experience unanimously agree that instead of a toil, shaping up becomes a pleasure. Doubtless this arises largely from stimulation of the artistic as well as the mechanical instincts, and for these reasons the writer once more wishes to draw attention to the value of this line of teaching, particularly for students, and to anticipate such criticism as may hereafter be directed against it by the general practitioner on the score of difficulty. No difficulties exist which are beyond the skill of the average man, whose training should enable him to perform the simple operations already described, in the time given, and a little practice should result in sufficient skill being developed to enable him to undertake the more complex cases involved, some of which will be noted in the next section, dealing with bridge work.

(To be continued.)

MODERN PROBLEMS IN THE PHYSIOLOGY OF DIGESTION AND METABOLISM IN RELATION TO DENTITION.
(I.) THE CALCIUM METABOLISM IN ACIDOSIS.

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(Read before the Maryland State Dental Association, March 10, 1910.)

It is important for the dental pathologist to recognize that the causes for the destruction of the enamel and the dentin do not come exclusively from the outside, *i.e.* from the mouth. In other words, they are not all external causes.

Very important destruction of both enamel and dentin can be wrought by internal causes which reach the tooth structure by way of the blood current or the lymphatics. Whenever the blood is supercharged with an amount of acid which the alkalis present in the circulation are incapable of neutralizing, we have a condition to which Naunyn gave the name of "acidosis."

ABSOLUTE AND RELATIVE ACIDOSIS.

There are two forms of this condition, which have been called (*a*) the "absolute" and (*b*) the "relative" acidosis. We must conceive that there are two ways in which an increased acidification of the blood can come about. Either—first, there is an increased production of acid; this is the *absolute* acidosis. Secondly, the quantity of alkalis that stand at the disposal of the organism are abnormally diminished; this is the *relative* acidosis, or *alkalipenia*.

In both cases, one of the consequences is increased excretion of ammonia by the kidneys. In absolute acidosis, the acids that are formed in excess are primarily bound to fixed alkalis, but as these do not suffice, as a rule there is an increased excretion of ammonia. In this case the excretion of ammonia is a secondary phenomenon. In the second case, the relative acidosis, the increase of ammonia excretion is primary, because

the organism is endeavoring to protect its store of alkali.

The acid which has been most definitely associated with bringing about the overloading of the blood is oxybutyric acid, but there are other organic acids that can have the same effect. (See Von Noorden, "Handbuch der Pathologie des Stoffwechsels," vol. ii, p. 81.)

EFFECT OF AMMONIUM CHLORID CONTAINED IN THE BLOOD.

Whenever the supply of alkali in the blood has been exhausted by a pathologic condition, such as occurs in rhachitis, osteomalacia, gout, uric acid diathesis, diabetes, the organism seeks to adjust the balance between acid and alkali by gradually invading those tissues that are composed of substances which are capable of neutralizing acids. These are, above all, the bones and the teeth. As a proof of this, we notice the improvement that follows when calcium is administered internally in these conditions, and in diabetes, particularly, we are familiar with the temporary recovery from diabetic coma by the hypodermoclysis of alkaline solutions, and even after colon injections of alkali. This direct solution of the calcium-containing structures of the body by blood that is less alkaline than it should be is only one way in which these tissues can become diseased. A second way, and one that is very rarely dwelt upon, even in special works on this subject, is the solution of calcium-containing tissues by the ammonium chlorid contained in the blood. Whenever the blood, from any cause whatever, has lost its free alkali, ammonium chlorid is formed, and if this is not a very short process, the ammonium chlorid, though not an acid itself, can act like an acid, and will bring about an increased excretion of calcium. That calcium plays an important rôle in the construction of the tissues is evident from the investigations of Röse (*Deutsche Monatsschr. f. Zahnheilkunde,* 1908; COSMOS, January 1909, page 135), who found that in regions where the water was hard, *i.e.* contained considerable calcium, the percentage of imperfect teeth among the population was less than in regions where the water was soft.

I have said that if the blood loses free alkali, ammonium chlorid is formed, and that if this continues for any length of time, this salt may have the effects of an acid, and in this connection I desire to call your attention to an experiment by L. de Jager (*Zentralblatt für die gesammte Physiologie u. Pathologie des Stoffwechsels,* January 1909, p. 63) and my own experiments in the physiologic laboratory of the University of Maryland.

EXPERIMENTS.

A sound tooth was taken and placed in a solution of ammonium chlorid; in two hours the solution contained phosphoric acid; after twenty-four hours, a precipitate is produced by heating with NaOH, after the tooth has been removed from the solution. If now, carbonic acid is led through the solution, it is possible to recognize phosphoric acid by testing with ammonium molybdate in fifteen minutes. This phosphoric acid could only have come from the calcium phosphate in the dentin and the enamel. A tooth that was placed in ammonium chlorid for eleven days lost 72 mg. in weight. Another sound tooth lost 38 mg. in five days. The enamel had become very soft, and could be rubbed off like chalk. This experiment proves that a neutral salt like ammonium chlorid can produce dissolution of the tooth substance.

INTRODUCTION OF ALKALIS OR CALCIUM INTO THE BLOOD.

Now, when the blood contains too little alkali, there is too much ammonium chlorid formed as a consequence. The same is the case when there is a calcium impoverishment. In both cases we can remedy the evil by introducing either alkalis or calcium into the system. I therefore prefer to explain the defective formation of the enamel and

dentin in some human diseases by a deficiency of the calcium in the body, and this again is caused by one of the forms of acidosis that I have described.

ENDOGENOUS CAUSE OF SOME DENTAL CARIES.

The theory of Miller, according to which caries of the teeth is always caused by a formation of lactic acid in the mouth, which it is claimed causes a solution of the enamel and subsequent invasion of bacteria, may be true in some forms of caries, but it has always struck me as singular that tartar, which consists largely of calcium carbonate, and which is more soluble in lactic acid than enamel, and which is mostly formed on diseased teeth, should be formed at the same time as the destruction of the teeth goes on. If tartar is more soluble in lactic acid than enamel, as it really is, we would assume that tartar should protect and not further the destruction of the teeth. It seems probable to me that the destruction of the enamel does not occur always from without and penetrate inwardly, but that it occurs from the dentin, that it is sometimes endogenous, not exogenous, and that the bacterial invasion may be a phenomenon secondary to this. The dentin is a living tissue, and it seems more acceptable that the disease should, in some cases at least, begin from the pulp and not from the mouth side of the tooth.

URINARY ANALYSES ADVOCATED.

This bit of metabolism of the tooth should lead dentists not only to test the mouth for acidity, but also the urine for its total acidity, and if it is persistently in excess of the normal, and if an excess of ammonia is excreted, calcium should be administered internally in the form of calcium lactate and calcium phosphate, about 2 to 3 grams per day, together with an alkali. The most preferable one for these particular cases has been, in my experience, the sodium citrate.

The diet should be carefully prescribed for at least four days before such urine is collected, its quantity and composition known, and the urine always collected for twenty-four hours. The analysis itself had best be executed by a physiologic chemist who specializes in metabolism. A more accurate method to determine the degree of acidosis is the ascertaining of the amount of ammonia in the twenty-four hours' urine.

When the composition of the diet is exactly known, it is possible to discover, by quantitative analysis of the NH_3 of the urine, when the amount of the NH_3 excreted by the kidneys exceeds the amount contained in the food. It is then that the organism attacks the NH_3 and other alkaline reserves of the normal tissues. Whenever the NH_3 excreted in twenty-four hours in the urine exceeds the NH_3 in the food, the patient is forming abnormal amounts of acid, and excreting it, after anchoring the acid to the NH_3 of his cell protoplasm. The principal organic acid that can be formed in this way is beta oxybutyric acid, sometimes acetone and diacetic acid. In gout and some forms of rheumatism it is the uric acid that requires an excessive amount of alkali for neutralization. The oxybutyric acid is formed intracellularly in diabetes, *i.e.* within the cells of the body. Not that acids which are excreted do the damage, but those that are retained unneutralized in the organism. The pathologic formation or retention of organic acids does not only consume and exhaust the supply of soluble alkali in the circulating blood, but when the alkalescence of the blood has sunk to a low degree, then the calcium-containing tissues are attacked. A diabetic when in a condition of acidosis loses calcium by the urine, which then contains more calcium than normal. (D. Gerhardt and W. Schlesinger, and C. von Noorden.)

The relation and influence of the glands of internal secretion on the calcium metabolism of the body will be dwelt upon in a future communication. It constituted the subject of an address

given by invitation of the Maryland Dental Association in 1914. The most recent reference to this interesting subject has been made by Olof Bergeim, F. T. Stewart, and P. B. Hawk, "Calcium Metabolism After Thyroparathyroidectomy," *Journal of Experimental Medicine,* vol. xx, No. 3, p. 225.

MUNICIPAL CONTROL OF DENTAL CLINICS.

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(Read before the Dental Society of the State of New York, at its annual meeting, Albany, May 14, 1914.)

IT is said that public health is a purchasable quantity and that a community may, within reasonable limits, determine its own death-rate or community health. From a business standpoint, it is urgent that any community determine—taking into account its financial condition—what portal of disease is the proper one to control.

Purchasing public health means efficient concentration. Most communities waste whatever appropriation may be made in the interest of public health. After a year's endeavor there is no concrete measurable quantity which a wasteful community may produce as a positive asset in its endeavor to obtain a larger appropriation for the extension of its work.

If the authorities in charge of the appropriation would use the money in a concentrated effort to cover efficiently one field, or such proportion of one field as the amount of funds allows, it would be possible to produce a positive statement of fact, and put the responsibility of sufficient funds to control all fields squarely up to those guarding the grant of appropriation.

If the needs of a community are known and stated, and a statement of fact is made that with the present allowance of funds the community is able to attack and care for only 10 per cent. of its needs, either it is absurd, ridiculous, and wasteful to grant the present funds, or it is necessary, proper, and economic to grant a sum sufficient to care for all the needy and not for a very small proportion. New York is the most progressive and liberal city in the world in the matter of conserving the health of its inhabitants. The experience of New York may be used as an illustration of the periods of development of a preventive measure for public health.

DEVELOPMENT OF ORAL HYGIENE MEASURES IN NEW YORK CITY.

The gross sum of money allowed the department of Health to conserve child life is $651,195. Of this sum, $496,394.23 is used for medical inspection of schools, care of foundlings, supervision of midwives, day nurseries, and institutions, issuing of employment certificates, and for children's clinics and hospitals; $140,787.26 is used for milk stations or the work of reducing the mortality rate among infants. The actual cost of clinics and hospitals is $77,425.81. The dental service costs approximately: 1 supervising dentist, $1500; 9 dentists, at $1200, $10,800; equipment and apparatus, $3500; current expenses, $2500; nursing service, $4500.

When the clinics were opened, there was little knowledge about our ability to furnish a *clientèle.* Within a month the fear of an insufficient *clientèle* was supplanted by a horror of the inadequacy of the service. Appointments were

made, and those who came first were given the preference. This method continued for about eight months, and brought us to the period when we must estimate our needs for the new budget. We who were actively engaged in the work knew how important our needs were, but when we attempted to tabulate and show as a definite asset what we had done, how much there was to be accomplished, and then how much could not be attempted, we were not able to present our facts in a thoroughly businesslike way. The reason was that our efforts were spread over such a great area that their results, from a practical and demonstrable standpoint, were lost. Wherefore the director of the bureau of Child Hygiene advised limiting our efforts to certain schools in the neighborhood of the clinics, and caring for the children of the first and second year classes in these schools. At the end of a given period under this plan we had very positive data, that allowed of drawing undeniable conclusions.

METHOD OF SELECTION OF WORTHY CASES FOR DENTAL DISPENSARY WORK.

The method of obtaining the children for the clinics is as follows: A nurse is specially detailed for afternoon service, and she collects the children at the school, takes them to the dental clinics, and also returns them to their homes. Appointments are made so that those children who have received treatment return until they are discharged as cured. The usual precautions against imposition in regard to free dispensary work obtains, and I believe that the city of New York exerts a most ideal control. The teacher of the class knows the financial and social status of the family; the school nurse knows about the home conditions, and she must not send any child to the clinic unless the case be a worthy one; the registrar at the clinic will not receive any child for treatment unless the child presents a card signed by the school nurse, and a consent card signed by the parent.

TABULATED RESULTS OF THE YEAR OF 1913.

Merely from a municipal economic standpoint, a glance at the following table will show the value of the work to the city, and the work accomplished by the department clinics during the year 1913:

YEAR ENDING DECEMBER 31, 1913.

Dental Clinics.

	121st st.	Second ave.	169th st.	Herk. st.	Throop ave.	Lawrence st.	Bay st.	Total.
No. registered	*1,867	1,478	900	769	1,161	887	205	7,267
Male	*691	715	351	370	515	460	**	3,102
Female	*868	763	549	399	646	427	**	3,652
Revisits	3,729	4,452	1,693	881	661	2,493	**	13,909
Total visits to dispensary	5,503	5,930	2,593	1,650	1.822	3,380		20,878
No. discharged	1,045	1,433	892	750	878	695	80	5.773
" cured	872	693	601	380	796	496	59	3.897
" dropped	173	740	291	370	82	199	21	1,876
No. treatments ...	15,918	10,025	7,902	6,921	4,818	7.198	291	53,073
No. fillings	6,279	4,412	2,698	2,711	1,846	3,784	159	21,889
temporary	1,168	1,109	400	976	267	1,222	51	5,193
permanent	5,111	3,303	2,298	1,735	1,579	2,562	108	16,696
No. extractions ...	3,270	2,347	1,778	1,525	1,702	1.944	394	12.960
temporary	2,741	1,951	1,439	1,234	1,337	1.450	286	10,438
permanent	529	396	339	291	365	494	108	2.522
Cleanings	199	60	12	244	107	91	—	713
Abscesses lanced ..	—	42	38	7	—	—	—	87

* Discrepancy in figures owing to lack of complete records for the first part of the year.

** Record of this not kept for the first part of the year.

EFFECT OF DENTAL DISEASE ON SCHOOL ATTENDANCE.

The cost of educating a child is about twenty cents a day. The following table shows the number of absences due to toothache or allied mouth trouble during the months of January and February among children with and without dental treatment:

Registration.

Class.	P. S. 122.	P. S. 63.
1A	314	121
1B	136	144
2A	181	133
2B	187	175
	818	573

NOTE.—In P. S. 122, 20 per cent. of the absences occur in those who received dental treatment, as compared with 45 per cent. absences among those who did not receive dental treatment.

	P. S. 122.		P. S. 63.	
Attended dental clinic	362	403	27	134
Attended private dentist	41		107	
Not receiving dental treatment	415		439	
Absentees receiving dental care	156=39 per cent.		89	
Absentees not receiving dental care	389=94 per cent.		243	

to the preventoria until the teeth and mouth are in good, wholesome condition. "There is no single factor that so impoverishes a community as disease, and there is no single portal that so greatly predisposes to disease as bad teeth and bad oral hygiene." The conclusion, therefore, seems inevitable that, if a community seriously wishes to rid itself of the stigma of a high incidence of contagious

THE ECONOMIC PHASE OF ORAL HYGIENE.

If the same value obtains throughout the year, the loss of money to the city is an enormous sum. Considering that eight years is the limit that most children spend in school to qualify for provident citizenship and that anything that interferes with this time is a loss to the individual, the probable cost to the city in caring for irresponsibles in appalling. Children with bad teeth and bad mouth hygiene are the ones who most surely contract contagious diseases—scarlet fever, measles, diphtheria—and it is interesting to consider the numbers who would have escaped if their oral conditions had been sound and healthy. The difference represents a real financial loss; the loss in future morale is even more.

Medical men need no proof of these conditions. We know in our own practice that certain children do not contract contagious diseases, because they are physically normal. If the proper repair of teeth will prevent contagion, what a saving it would be to assure adequate dental service! Children in the early stages of tuberculosis are not admitted

cases, it must provide for a proper oral hygiene education of children in the homes and in the schools. Tooth-brush drills and hygiene leagues are valuable factors in schools. Mouth hygiene must be considered as a routine procedure, and children constantly advised to brush their teeth. The following circular is issued by the department:

DEPARTMENT OF HEALTH

CITY OF NEW YORK

DIVISION OF CHILD HYGIENE.

Instructions to Parents Regarding the Care of the Mouth and Teeth.

The physical examination of school children shows that in many instances the teeth are in a decayed and unhealthy condition.

Decayed teeth cause an unclean mouth. Toothache and disease of the gums may result.

Neglect of the first teeth is a frequent cause of decay of the second teeth.

If a child has decayed teeth, it cannot properly chew its food. Improperly chewed food and an unclean mouth cause bad digestion, and consequently poor general health.

If a child is not in good health, it cannot keep up with its studies in school. It is more likely to contract any contagious dis-

ease, and it has not the proper chance to grow into a robust, healthy adult.

If the Child's Teeth Are Decayed, It Should Be Taken to a Dentist AT ONCE.

The teeth should be brushed after each meal, using a tooth-brush and tooth-powder.

The following tooth-powder is recommended: Two ounces powdered precipitated chalk; half-ounce powdered Castile soap; one dram powdered orris root; thoroughly mix.

This prescription can be filled by any druggist at a cost not to exceed fifteen cents.

The child should take the tooth-brush and powder to the school, and receive instructions from the nurse as to their proper use.

The department of Health maintains at the following addresses dental clinics for the treatment of school children:

Borough of Manhattan—449 E. 121st st., 164 Second ave.

Borough of Brooklyn—330 Throop ave., 124 Lawrence st., 1249 Herkimer st.

Borough of The Bronx—580 E. 169th st.

[Issued by order of the Board of Health.]

The following is a report on the first free dental clinic:

[DIVISION OF CHILD HYGIENE.]

A FREE DENTAL CLINIC FOR SCHOOL CHILDREN.

The medical inspection of school children in New York city has shown clearly that in one direction at least the facilities for treatment, either free or at a nominal cost, are absolutely deficient. The city is fairly well supplied with dispensaries and hospitals where the poor may obtain free medical or surgical care, although there are still certain districts in the city, notably those not densely populated, where facilities of this kind are not adequate. When the family is able to pay a small fee for medical services, physicians can usually be found who will give an adequate return in treatment, but the average fee for competent dental care is above the means of a great proportion of the people, and free dental clinics are the exception.

During 1910, out of 266,426 children examined in the public schools, 94,630 were found to have defective temporary teeth, while 69,620 had more or less serious defects of the permanent teeth. Inspections for these defects were made by physicians, but it is probable that many minor cavities were overlooked, as the schools are not equipped with facilities for complete dental examinations.

A special examination made by a dentist of 500 children between the ages of fourteen and sixteen years who were applicants for working papers at the department showed that 495 were in need of dental care. It is unusual to find a child under the age of ten years who has not one or more defective teeth, while above that age the defects are almost equally prevalent. It may safely be assumed that every child of school age needs dental supervision, if not actual dental treatment.

To meet this situation, New York city has in all of its boroughs eighteen dental clinics. Three of these, maintained by the Children's Aid Society, are kept fully employed by the care of the teeth of the children attending the society's schools. Fourteen of the clinics are connected with general dispensaries or dental colleges, and treat adults as well as children. The remaining one devotes its services exclusively to children from the public schools.

Some few public-spirited dentists have volunteered to treat school children free on one or two afternoons a week, and their services are greatly appreciated by the department.

It may readily be seen that there are great difficulties in the way of obtaining proper dental care for children whose parents are totally unable to pay anything, or those who, at the best, can pay but a small fee. As corrective treatment is so difficult to obtain, the department has felt the necessity of confining its main efforts to the question of preventive treatment, and for the past two years all of the children found with defects of the temporary teeth have been instructed in the hygienic care of the mouth and teeth by the nurses from the department of Health. Each child is required to obtain a tooth-brush and tooth-powder and to bring them to the school, where their use is demonstrated by the nurse. The children are assembled in groups, and regular "tooth-brush drills" are held. Repeated reinspections are made by the nurse, both at the school and at the children's homes, to see that instructions are obeyed. For defects of the permanent teeth visits are made to the home of the child, and regular dental treatment urged. Notwithstanding the most strenuous efforts in this direction during 1910 but 26,175 or 37.6% received regular dental care. Each child found with defective teeth is given a copy of the following circular. [See preceding page.]

On January 15, 1910, the first free dental clinic exclusively for school children to be established in New York city was opened at 449 E. 121st st., Borough of Manhattan, as a result of the efforts of the Honorable Peter T. Barlow and a number of his friends. The

entire amount of money needed to equip and maintain this clinic was contributed with the understanding that the department of Health should detail a nurse to have general supervision over the children, and that only those children should be treated who attended the public schools, and whose parents were too poor to pay for the treatment. Applicants are visited at their homes by the nurse, who investigates the financial status of the family and determines whether or not free treatment is justifiable. The nurse also assists the dentists during the treatment hours and keeps all cases under supervision to see that the children return regularly for treatment, and that they are thoroughly instructed in the care of the mouth and teeth.

The clinic proper occupies two rooms, one of which is used for the patients who are waiting for examinations or treatment and the other equipped with the necessary appliances, including two dental chairs. Two dentists are regularly employed, and they are both on duty every afternoon from Monday to Friday inclusive, and on Saturday mornings. The following is a report of the first year's work:

Total Cost of Equipment and Maintenance January 15, 1910, to January 15, 1911.

Dental equipment and furniture .		$383.40
Dental supplies		746.21
Rent	$564.50	
Wages	222.50	
Coal, water, insurance, lighting and telephone..	213.05	
Printing and stationery ..	103.99	
Repairs and sundries	205.16	
Salaries of dentists	1.292.50	
Salary of nurse	900.00	
Permanent installation ..		$1.129.61
Running expenses	3,501.70	3,501.70
Total expense		$4,631.31

Work Performed from January 15, 1910, to January 15, 1911.

No. of children treated	1,129
No. of treatments	5,925
No. of fillings	4,861
(root canals 764)	
No. of extractions	1,499
(temporary 927)	
No. of cleanings	469

Each child treated had its teeth put in perfect dental condition before it was discharged.

An analysis of these figures will show that, deducting the cost of installation which, with slight depreciation in value, will be permanent, the average cost of complete dental treatment for each child was $3.10. Including equipment, the average cost per capita was $4.10..

The cases varied in severity, but the majority were extreme cases of neglect. The average of over four fillings and one extraction for each child gives an indication of the conditions met.

Neglect of the care of the teeth in childhood, with the resultant malformations of the jaw and often loss of the teeth themselves, is undoubtedly one of the causes of impaired physical efficiency throughout life. The conditions in this regard existing among the school children of New York city at the present time warrant serious consideration. The presence of decayed teeth means improper mastication of the food, and the child suffers consequently from indigestion and resultant malnutrition and anemia. Unclean mouths and decayed teeth act as breeding-places for many forms of pathogenic bacteria, and the liability to contract contagious disease is greatly increased. As a result of decayed teeth we often find enlarged and sometimes suppurating cervical glands. Local pain and discomfort, with many other abnormal physical symptoms and conditions, can often be traced directly to this source.

The practical results of this condition upon the school progress of the child is worth considering. There is a distinct loss of time in school, due to local pain and discomfort and to the many diseases which find their starting-point in the neglect of the mouth and teeth.

Dr. Leonard Ayres of the Russell Sage Foundation has made a tabulation of the records of the physical examinations of 7,608 children who had been examined by the inspectors of the division of Child Hygiene. He found that children with defective teeth progressed 6 per cent. more slowly in their school grades than normal children, and that whereas the average child with no defects completed eight grades in eight years, the average child with defective teeth took 8.5 years to complete the same course.

The establishment of the free dental clinic for school children is a splendid example of true civic helpfulness. It is probable that in the establishment of more clinics of this nature a certain proportion can be made either entirely or partially self-supporting.

The people of this city owe a debt of gratitude to the generous men and women who have supported this clinic, and the results of their efforts are worthy of serious con-

sideration by all who are interested in the welfare of children.

CONCLUSION.

A clean mouth means clean teeth and clean throat; these in turn mean a clean mind and body. With this healthy combination assured to every child, we need not fear for the continued welfare of the nation.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

INTERNAL SECRETIONS.

By EDMUND M. POND, M.D., Rutland, Vt.,
SURGEON TO THE RUTLAND HOSPITAL; SURGEON TO THE PROCTOR HOSPITAL.

(Read before the Vermont State Dental Society, May 20, 1914.)

IN presenting this subject to the dental profession, I am aware that I may be able to give but few facts of practical value to you as dentists. But as it is a subject that is exerting a great influence upon the medical and surgical world, and as the possibilities of its influence in the domain of dentistry are being recognized, I am sure that any remarks that may arouse your interest at this time will eventually prove of value.

The question of the glands of internal secretion and their effect upon the human body is indeed one of importance and interest not only to you on behalf of your patients, but to you yourselves, who are daily overworking some of these glands and are constantly suffering from the ill effects; for these glands are absolutely necessary to the maintenance of life, and no person can be well unless they are acting properly.

Let us consider the principal glands of internal secretion in the following order: The Pituitary. The Adrenals. The Thyroid. The Parathyroids. The Thymus. The Testes. The Ovaries.

The limits of this article do not permit of our discussing the lesser sources of internal secretion, such as the pineal gland or epiphysis, a small gland in the brain considered by the ancients as the seat of the soul; the spleen, pancreas, liver, chromaffin system, etc.

THE PITUITARY.

The Pituitary, or Hypophysis as it is also called, is situated at the base of the brain, and is composed of two lobes, the anterior and the posterior, of absolutely different functions. The anterior lobe of the gland presides directly over the growth of bones—too great secretion in the young developing giants, who are usually shortlived; too little secretion, dwarfs. In acromegaly, which is the condition produced by over-secretion in adults, we find enlargement of the extremities, the head, nose, hands, and feet, together with changes in the nervous system and temperament. A characteristic alteration brought about by this disease was observed in the cases of two millionaires whose dispositions were entirely changed from marked generosity to noticeable stinginess. Of dental interest is the observation that patients suffering from diseases of the pituitary gland have regular teeth but the teeth are not properly spaced. The posterior lobe—which is the active lobe and the one used in organotherapy—when too active, produces an increased arterial tension, intestinal and uterine contraction, and contraction of other involuntary muscles. It is very plain to be seen how too great action of the posterior lobe may lead up to arterio-sclerosis and other diseases

with high arterial tension. It has long been known that irritation of the floor of the fourth ventricle, or in other words irritation of the pituitary, is followed by glycosuria; and later researches as to the functions of the posterior lobe have established the fact that this gland presides over the metabolism of carbohydrates. A diminished amount of posterior lobe secretion is followed by adiposity and an increased sugar tolerance with low body temperature and diminished sexual activity. One point of practical value to the dentist which may be brought out in this connection has relation to caries. It is generally accepted among your profession that the presence of starch and sugar products between and around the teeth, if allowed to remain in contact with them for any length of time and to decompose into lactic acid and other compounds, produces an unhealthy condition of the gums, and by corroding the teeth invites microbic infection followed by caries. May not this same condition be brought about by diseases of the posterior lobe of the pituitary, which, loading the system with sugar, constantly pours sugar products into the mouth by the saliva? Since it is stated by good authorities that the saliva is a better test of the blood than is the urine, and that sugar often appears in the saliva before appearing in the urine, might not frequent tests of the saliva for sugar be a great safeguard? It is a well-established fact in surgery that diabetes produces gangrene. Why may not the same substances poured through the saliva into the mouth have a similar deleterious effect and produce caries and unhealthy gums? Also in diabetes, gout, and other conditions caused by a diseased pituitary, there is produced an acid saliva which is highly destructive to the teeth. As this acid saliva is such a serious condition, would it not also be well for the dentist to make it a matter of routine to test the saliva to know whether it be acid or not? In surgery we now use pituitrin, derived from the posterior lobe of the pituitary, to produce intestinal peristalsis, and it is giving most gratifying results even when other means fail. In obstetrics, pituitrin is highly effective and is extensively used to produce uterine contraction in cases where the uterus is sluggish or tired. In pregnancy there is always enlargement of the pituitary and thyroid, the pituitary being often so active as to cause symptoms of acromegaly, and it is occasionally so enlarged that by its pressure on the optic commissure it may even produce blindness, which, however, passes away after parturition with the subsequent involution of the pituitary. A deficiency of thyroid and pituitary secretion in the system during pregnancy may cause an undeveloped child. Posterior lobe activity during pregnancy also probably causes sugar temporarily in the saliva and may account for the dental troubles common at that time—so common, indeed, that the saying, "For every child a tooth," is said to have an equivalent in every language. The pituitary also exercises some control over sleep.

THE ADRENALS.

The Adrenals, small glands situated one above each kidney, have a most powerful effect in contracting the capillaries, consequently producing a high blood pressure; and this prolonged irritation eventually brings on arteriosclerosis. This contraction of the capillaries must of necessity influence the blood supply of the mouth and have a consequent effect upon the teeth and gums. Every time we are excited, every time we worry, a reflex action is sent to the adrenals which causes a pouring into the system of adrenalin, the latter increasing the heart action and the arterial tension. This fact explains why worry and excitement so often lead to arterio-sclerosis, heart disease, and nephritis. Impairment of the adrenals is followed by alterations in the nervous system, general depression, and a bronzy pigmentation of the skin. The adrenals, when normal, aid in the destruction of poisons within the system.

THE THYROID.

The Thyroid gland—situated, as you know, in the anterior neck—and to which more study has been devoted than to any of the other ductless glands, is now quite well understood with regard to most of its functions, and its extract is being administered with most beneficial results. The thyroid is the organ in the body most active in the destruction of poisons, though this privilege is shared by the pituitary, and also, as we have just said, by the adrenals. In cases of infection these three glands, the thyroid, the pituitary, and the adrenals, become extremely active, and are often exhausted by the struggle. Since these glands are so necessary to vigorous life, their exhaustion accounts in a great measure for the profound general exhaustion following upon septic and infectious diseases. With the pituitary, the thyroid controls the growth of bones. As during pregnancy a woman needs more than the ordinary amount of these secretions to develop her offspring, the thyroid and the anterior lobe of the pituitary enlarge; but if the glands are unable to manufacture a sufficient supply, this increased demand should be met by animal extracts. The organs of reproduction are directly under the control of the thyroid. Sleep, too, is controlled by the thyroid, with some aid from the pituitary, and a greatly diminished amount of thyroid secretion in the system has been known to produce such a state of sleepiness that patients fall asleep while waiting in a doctor's office or even while sitting at the table eating their meals. This condition is corrected by the administration of thyroid extract. An over-abundance of thyroid secretion in the system, however, is productive of the opposite effect, overmuch brain activity and vitality, and when the thyroid is exceedingly overactive, extreme nervousness is produced, as in Graves' disease. The thyroid presides directly over longevity, and there is no reason why a good ripe old age should not be attained, other conditions being propitious, if the thyroid gland is in a healthy condition. Certain foods containing much thyroid extract, such as eggs, and particularly milk, have been found most potent in lengthening life, as the following very interesting statistics will show: In the little country of Bulgaria, where the people take daily a large amount of sour milk which, to be sure, in addition to the thyroid extract contains a microbe called *maya*—out of a population of 7,000,000 inhabitants there are 3800 persons over 100 years of age, while in the beer-drinking country of Germany, out of 61,000,000 inhabitants there are only 71 centenarians.

The thyroid presides over the growth of hair, and thyroid treatment will often turn gray hair back to its original color and will even make hair grow on bald spots. The condition of the thyroid affects the skin, and it is now being claimed that it has a powerful influence in the development of the jaw-bones and in dentition. Since we know that a child backward and undeveloped in every respect will grow in body and mind if fed on thyroid extract, why is it not reasonable to suppose that cases of undeveloped jaws and teeth may be caused by deficiency in thyroid secretion? But right here it must be stated that great caution should be observed in the use of animal extracts, and in giving any of them one must know pretty surely just what treatment the symptoms demand.

The thyroid is the great iodin factory of the system, and in Graves' disease, for instance, in which there is over-secretion of the thyroid, the system is fairly loaded with iodin, and the administration of even small amounts of iodin or of thyroid extract increases the symptoms of disease enormously. Consequently you should bear in mind that when there are any symptoms of thyroid disease from over-secretion the greatest caution should be employed in the use of iodin, even when applied to the gums.

Will power, courage, judgment, and discrimination between right and wrong are dependent upon a normal thyroid, and it is probably no exaggeration to say that diseases of the ductless glands

often lead directly to crime. Loss of memory is often caused by a lack of thyroid secretion, but, happily, thyroid therapy will many times correct this condition.

We cannot, in closing our consideration of the thyroid gland, better gage its tremendous influence upon the human organism than by contrasting the effects produced by its too great or too small amount of secretion as evidenced in Graves' disease and in cretinism. In persons suffering from Graves' disease we find tremor, heart palpitation, restlessness, sleeplessness, hysteria, and a generally high-strung nervous condition. This being usually a disease of adult life, there is no skeletal deformity; while the victim of cretinism, a disease of youth, is of low stature, broad, with a large head, low forehead, flat nose, muddy skin, short and often crooked legs; with very little hair on the head or face, brittle nails, and carious teeth; with a dull and apathetic expression, and a mind almost totally undeveloped—in brief, an idiot and repulsive in the extreme.

THE PARATHYROIDS.

We now come to the consideration of the Parathyroids, four tiny glands each the size of a split-pea, tucked away behind the thyroid, whose importance is in inverse ratio to their size, since their impairment causes tetany, and their removal death. The parathyroids control the formation of lime in the system, and since lime and magnesia enter so largely into the making of teeth, this gland is especially important from a dental point of view. It has been proved by extensive investigation that wherever lime is present in the drinking water the people have the best teeth, hard, yellow and healthy, and where soft water is drunk they have white teeth, very much subject to decay. It is also of interest to know that careful investigation shows children or infants suffering from tetany due to impaired parathyroids to have teeth showing a marked defect in their protective enamel coverings. In view of the foregoing facts, why is it not advisable to give children calcium when they show a diseased condition, or a deficient development, of the teeth, especially to those having a history of convulsions?

THE THYMUS.

The Thymus gland, situated behind the upper sternum, is particularly active during fetal development, and presides directly over skeletal growth during this period and up to thirty months of age. When thymus secretion is deficient the bones do not ossify, and are at first so soft that they can easily be cut with a pair of scissors, though they may later become brittle and friable. This softness of the bones leads to deformities of all kinds. According to the action of the thymus, the hair is either very soft and fluffy or stiff and bristly, and corresponding defects in dentition occur, the teeth as well as the hair being really epithelial products.

THE TESTES.

The Testicles have long been considered of importance with reference to their internal secretion, and in 1889 Brown-Séquard, the celebrated Paris nerve specialist, brought forward his "Elixir of life," which, as you know, was a testicular extract. Hundreds of years before this, however, it had been thought by many that the secretion from the testicle was of the utmost importance to life, the ancients basing their belief upon the alterations brought about by castration, of which there is no better illustration than the contrast between the wild, fiery bull and the tame, docile ox. A peculiar condition is noted in castration: When both testicles have been removed there is a diminution in the size of the cerebellum, and when one testicle only is removed the cerebellum of the opposite side atrophies. The difference between a normal man and a eunuch are very marked, for in the case of the eunuch his arms and legs are long, his face is wrinkled, and he appears aged far beyond his years, while

in character he is cowardly, superstitious, vain, avaricious, cruel, and lacking in intelligence. He is usually shortlived.

THE OVARIES.

The secretion of the Ovaries is of vital importance to the health and well-being of women, and while their removal does not cause as marked changes as does castration in men, still it will be noted that a woman deprived of her ovaries first suffers the nervous effects of menopause and then becomes wrinkled and fat, also showing the signs of premature old age. There are alterations, too, in the heart, liver, and intestines. Considering these results, you will understand why surgical gynecology is so anxious to save an ovary, or even a piece of an ovary, whenever possible. Childbearing is especially conducive to the retention of youth and freshness in women, as during pregnancy a greatly increased amount of ovarian secretion is produced by the formation of the corpus luteum, which has an important internal secretion. The ill effects of exhaustion of the secretion of the ovaries caused by disease and too frequent childbearing is clearly shown in the poor physique and ill appearance of many women.

In considering the glands of internal secretion it must always be borne in mind that, owing to the fact of the ferment or secretion of each one being poured directly into the blood and so carried to each of the other ductless glands as well as to all the other parts of the body, their interrelation is exceedingly close, so that a disturbed function in one gland may through its changed ferment affect any or all of the others. For instance, in diabetes, which, as we have mentioned, is caused primarily by a diseased pituitary, owing to this altered pituitary ferment being carried through the system by the blood we almost always find the pancreas and other secretory glands involved.

Another source of serious trouble to the ductless glands is the ptomains and fermentative products absorbed through the intestines. Lane has recently brought out very clearly the fact that even exophthalmic goiter and Addison's disease, a disease of the adrenals, have been induced by the auto-intoxication resulting from intestinal stasis; and he has effected immediate and permanent cures by sidetracking the small intestine and so producing intestinal drainage. In one case of Addison's disease upon which he so operated, within a few days after operation the patient's coloring had changed from the absolutely brown or copper color of a negro to that of a normal white man, showing to what an extent the adrenals had been overworked to combat the poisons produced by the intestinal stasis.

The very injurious effects upon the glands of internal secretion of over-indulgence in the use of stimulants, such as alcohol, tea, coffee, and tobacco, should be noted. Of these tobacco seems to be the most injurious, for while old age is often attained by steady alcohol-drinkers, there are few cases on record of a person greatly addicted to the use of tobacco living to be very old.

Small quantities of alcohol, in fact, stimulate the glands of internal secretion and increase their activity. But large amounts of alcohol produce too great stimulation with a consequent exhaustion of these glands, especially of the thyroid, the fatal result of which in the case of large, plethoric men addicted to over-indulgence in alcohol is frequently seen in their sudden death from pneumonia and other infectious diseases in which some of the secretory glands are needed to combat the infections. In treating the teeth and gums of patients of this description the advisability of thyroid treatment might well be considered.

The necessity of a proper amount of sleep to keep the secretory glands from overwork is very great; for during sleep the poisons produced by the exertions of the body and mind in the waking hours are carried off in various ways, but if a sufficient amount of sleep be not obtained to permit of this method of elimination, the poisons remain in the system and the secretory glands are then called

upon to do more than their normal amount of work and to combat these poisons, which should have been eliminated by some other means.

Among the means most effective in keeping the ductless glands in good condition are a daily hot bath, plenty of exercise and sleep, and careful attention to the state of the intestines—all these relieving the glands of the necessity of overwork; proper diet, moderation in the use of stimulants, and avoidance of undue excitement and worry. After this consideration of the glands of internal secretion, in particular and in general, I think you will agree with me that these apparently somewhat trivial rules of hygiene take on an appearance of vital importance when their bearing upon these glands is understood, glands upon whose maintenance in a proper condition to perform their functions depend to such a great extent our chances of health and longevity.

PRESIDENT'S ADDRESS—SIXTH INTERNATIONAL DENTAL CONGRESS.

By J. HOWARD MUMMERY, M.R.C.S., L.D.S., London, Eng.

IN accepting the important position of president of the Sixth International Dental Congress, an honor of which I am deeply sensible, I feel that I am undertaking a very great responsibility, the sense of which has grown upon me as I more fully realized the obligations that it entails.

The first International Dental Congress was held in Paris in 1889, followed by one in Chicago in 1893, in Paris again in 1900, St. Louis in 1904, and Berlin in 1909—this present congress being the first to be held in Great Britain.

The Committee of Organization are much gratified that his Majesty the King has graciously consented to be the Patron of the Congress, and thereby to emphasize the importance of dental science as a factor in the welfare of nations.

In order that the results of the deliberations of this congress may be rendered as useful as possible, the following system has been adopted.

The sections of the congress are ten in number. In each section certain important questions have been selected for discussion, and reporters on these questions have been chosen, by the council of the section, from the names of those nominated by their different nationalities. These reports, which will be published in full, will be given at the meeting in the form of a *résumé,* which must not occupy more than fifteen minutes, with ten minutes for a reply at the end of the discussion; speakers in the discussion are limited to five minutes.

Papers submitted to the section must not occupy more than fifteen minutes in delivery.

If this system is adhered to it is felt that much more valuable results will be obtained than would be possible if discursive and lengthy discussions were permitted, as the aim of the congress is to procure new and important matter in its different sections and to avoid as much as possible the confusion that is apt to occur in these great international gatherings.

Since the beginning of the present century the outlook of the dental profession has undergone a great change. Not long ago the dentist thought of little else but the filling of carious teeth and striving to keep down the ravages of disease by mechanical treatment; he did not

study general principles to any extent, or realize the important obligations of his position as the guardian of the mouth, the principal portal of infection for the whole body; but this is really his chief mission, and it should be fully realized by all.

Dental medicine and surgery is of the very highest importance not only to the individual but to the state and the nation. When we consider that most common and widespread disease of civilization, dental caries, or decay of the teeth as it is popularly called, we are appalled by its terrible results. It is so familiar to us all, it is not immediately dangerous to life, and the severe pain it produces is more or less easily controlled, so that it has come to be looked upon as the inevitable lot of civilized humanity; but it is a preventable disease, and if this fact were fully appreciated by the whole community, it would rouse them from their apathy to engage in a crusade which would reduce its ravages enormously.

To the state, such a crusade is of the very greatest importance; the rejection of recruits to the army and navy on account of defective teeth is strong evidence of this, but these instances where the matter comes prominently before the authorities are only a small proportion of the whole. The physical degeneration of the race caused by tooth disease is more widespread than has been appreciated either by state authorities or by the medical profession.

It is evident that any great reform in the endeavor to stamp out a disease of this kind must commence with the children, and when we remember that in one investigation in this country undertaken by the British Dental Association it was found that more than 86 per cent. of children of the poorer classes showed caries of the teeth, there cannot be any suggestion that this cause of physical degeneration has been exaggerated. In 10,500 children examined there were 37,000 unsound teeth.

The inspection by medical men under the Medical Inspection of Children Act has fully confirmed the extensive character of this evil; the percentages are not quite so high, but this is probably because the examinations were not conducted with quite the same care and knowledge as when carried out by dentists.

This does not mean only a certain amount of toothache, as many are apt to think, but it leads to gastritis and serious digestive derangements consequent on the bolting of food and septic products, enlargement of the lymphatic glands due to the absorption of toxic poisons, these glands often becoming tubercular; it means anemia and a lowered condition of bodily resistance, making the subject more liable to the attacks of such diseases as tuberculosis, and thus increasing the mortality from meningitis and tubercular peritonitis, so common in badly nourished children. We have, in fact, in these children a chronic disease which lasts often during the whole period of childhood and youth, and it is impossible that they can afterward become healthy men and women. It is because this infection is so chronic in its nature that its true cause remained so long unrecognized and the debility and pallor so characteristic of these children was assigned to various causes, such as unhealthy surroundings and other vague influences, which were only cited as an excuse for ignorance of the true cause.

Very much has already been done and is still being done in the establishment of school clinics to cope with this evil, both at home and abroad.

In England the pioneer school clinic was established in Cambridge in 1907 by the efforts of Mr. George Cunningham, the necessary funds being contributed by the generosity of Mr. Sedley Taylor, Fellow of Trinity College, Cambridge. The recent reports of this clinic have been most encouraging, and most conclusively demonstrate the great importance of the movement. According to the last report 72 per cent. of the children have now sound permanent teeth. Dr. Jessen's splendid work in Germany, and the clinics in America and many other countries, all mark the

commencement of a reform which cannot fail to be of the greatest benefit to future generations.

Caries is a preventable disease, but it is only preventable by the aid of coöperation on the part of government authorities, medical men, and the public themselves. There is no known specific for the cure of this widespread disease, but a careful attention to the hygienic conditions of the mouth and teeth and the employment of a suitable diet might do much in time to eradicate it.

This and other diseases of the teeth are of a very insidious nature, and the public will not recognize their importance so long as they do not cause pain. But pain is not by any means the only indication of dental or any other disease, and there is no doubt that much general ill health would be prevented by careful attention to the cleansing of the mouth; with a large majority, however, this is very little understood—such precautions are sadly neglected and the resulting ill health is attributed to other causes.

Whatever difficulty there may be in attaining to a clear understanding of all the predisposing causes of caries of the teeth, there is no doubt that the determining cause is carbohydrate stagnation—the fermentation which takes place in retained particles of starchy food by the agency of bacteria constantly present in the mouth resulting in the production of acids, which act upon the teeth. Thorough cleansing of the teeth and prevention of such accumulation is necessary to prevent disease. The researches of Dr. Sim Wallace, Professor Pickerill, and others have shown the great value of a suitable diet in the prevention of caries—the avoidance of much sugar, more especially in the form of sticky sweets, and the termination of a meal with acid fruits such as apples and oranges, tend to insure a free flow and limpid condition of the saliva, which is the natural cleanser of the mouth. This recommendation is based on scientific principles, and will, I think, survive the criticism of those medical authorities who consider it "absurd." Such criticism, especially when addressed to the laity, is doing much to hinder, instead of advancing, the cause of preventive medicine.

As repeatedly pointed out by Dr. Sim Wallace, food containing its fibrous constituents favors efficient mastication and has a direct cleansing effect on the teeth; when this fibrous part is removed, and such pappy foods as cornflour, rice, biscuits, white bread, and the multitude of food preparations advised for children are substituted, every opportunity is afforded for the accumulation of pulpy material between the teeth, favoring acid fermentation and the processes which result in dental caries. Children do not require minced and soft foods, but such a diet as will bring into action the muscles of mastication and will assist the natural healthy physiological processes that are kept in abeyance by such artificial methods of feeding.

While natural means of cleansing the teeth are to be considered the most important, the use of the tooth-brush is very necessary where soft adhesive food is habitually taken. We cannot, however, consider that the use of this implement, once or even twice a day, will compare, as a method of prophylaxis, with the habitual use of food of a nature to stimulate the flow of the cleansing saliva, especially at the termination of a meal; and most of us, I think, agree with Professor Pickerill when he says, "The tooth-brush should be regarded as an adjuvant to other means of prophylaxis." It is an artificial method of cleaning the teeth rendered necessary by the artificial conditions of modern life.

During the last few years the greatest advance in the science and practice of dentistry, and standing out most prominently from all other issues, is the more perfect understanding of the far-reaching effects of septic conditions in the mouth, meaning not only suppuration but toxic infection from bacterial cultures in and around the teeth.

The most common cause of septic infection from the mouth is the disease commonly called pyorrhea, an inflammatory condition of the surrounding tis-

sues of the tooth, the pericemental membrane, the gum tissues and alveolar bone, in very varying degrees of intensity, which is the cause of many obscure and severe affections of the general system. It is also especially to be noticed that very slight local manifestations of the disease may give rise to very severe constitutional disturbance.

It was long ago pointed out by Galippe that organisms from pyorrhea pockets produced affections of the joints when inoculated into guinea-pigs, and it is now well established that joint affections are frequently due to micro-organisms which have their culture chamber in the mouth.

Dr. Horder in a most interesting and suggestive paper, lately read before the Odontological Section of the Royal Society of Medicine, drew attention to cases of disease directly due to infection from the mouth, which had come under his own observation. He showed that among other affections inflammatory diseases of the eye and skin were due to this cause, as well as cases of joint disease, sciatica and brachial neuritis, endocarditis, anemia and general debility.

Suppuration is not a necessary factor in the spread of diseases from the mouth. Those conditions in which a gradual production and absorption of poisons is in progress give rise to effects on the system which are quite as injurious. It is plain to everyone that organisms when confined by firm boundary walls, as in an abscess, cause severe pain in addition to the general feeling of malaise. Here attention is immediately directed to the cause as manifested by the local pain and swelling, but equally severe and often considerably greater general infection is caused by organisms which have their dwelling-place in and around unhealthy teeth and gums.

The organisms are not confined by rigid tissue and do not cause pain, but their poisonous products are just as far-reaching, and more dangerous, as their origin is not suggested by the local sensations of pain or tension.

A very important point insisted on by Dr. Horder is that "Ill effects depend upon the net amount of toxin absorbed by the circulation and not upon the gross amount of toxin formed at the seat of infection." A very small focus of infection may give rise to severe symptoms, and the causes of such infection may be very obscure and difficult to detect. Many cases have been recorded in which teeth that have been skilfully treated showed by X-ray examination that they were the cause of serious poisoning the origin of which had never been suspected, being due to deep-seated septic infection of the bone under the roots of treated teeth apparently in perfect order. This danger from dead teeth is a very subtle one and has not been sufficiently appreciated.

I am desirous of avoiding any undue exaggeration. I do not wish to claim that all toxemic conditions are due to mouth organisms; there are many other causes of infection, but I think I am supported by the body of the medical profession who have considered the subject when I state that the principal source of septic infection is the mouth.

With regard to treatment, the profession seems to be at present divided into two schools, consisting of those who advocate the retention of diseased teeth in pericemental disease, after careful treatment, and those who consider that such teeth should be removed. I cannot but think that the adherence to any hard-and-fast rules of any school of treatment is a mistake; a careful judgment should be formed in each individual case. The great principle to keep in view is the avoidance of septic infection—whatever cause we find in the mouth must be thoroughly dealt with and the source of the infection removed. If septic infection by either bacteria or their toxins cannot be controlled by such treatment the offending organ should be removed.

We were duly impressed in our youth with the high importance of a tooth as an organ; it was to be preserved by some means, by almost any means, so long as it was preserved; but while we are fully aware of the importance of

teeth to health, we now look upon the teeth as portions of the whole human economy, to be viewed in connection with it and treated accordingly. If a tooth is ever so little septic and that septicity cannot be controlled by treatment, it has become a serious danger to the whole body, like a gangrenous limb, and should be removed. The question arises whether we are justified in telling any patient after a prolonged treatment of the teeth for pyorrhea that he is cured. According to our present knowledge we think not. He should be told that as the result of the course of treatment he has undergone the disease has been kept in abeyance and its constitutional effects prevented, and careful attention on his part may prevent a recurrence. If assured of a cure, he goes away with a false sense of security, neglects the necessary daily observance of rules of treatment of which he has presumably been informed, and the symptoms recur.

While a knowledge of the science of bacteriology and a comprehension of the great principle of antisepsis have led to great improvements in treatment, there is still room for a wider understanding and more extended application of these principles to daily practice. While we no longer relieve the pain from a septic tooth by draining it into the mouth, a common practice some years ago but now considered almost criminal, a great many septic roots and hopelessly decayed teeth are allowed to remain in the mouth to the serious danger of their possessor. I am aware that many patients insist on retaining such undesirable tenants, but they should only be allowed to do so on their own responsibility after due warning from their professional adviser.

There is, we think, still room for a more scientific and hygienic adaptation of mechanical appliances, and an avoidance of many of the evil effects of retention of food and of bacterial infection from this source. A more perfect understanding among all members of the profession seems desirable on this subject, and no appliance that is not capable of the most perfect cleansing should be considered admissible.

In our attack upon the sources of physical degeneration and disease, we claim that the dental specialty is one of the very highest importance in the great field of medicine. This has not been sufficiently appreciated in time past and is not even now so fully understood as it ought to be. Very much physical deterioration, very much unnecessary suffering, might have been saved had it been sufficiently realized. I am fully aware that during the last few years there has been a great improvement in this direction. A great many medical men now look to the mouth to see if it is likely to be the source of the sometimes very obscure cases of ill-health they have to deal with, but I am afraid the majority do not look first for this common cause, as the medical papers often show us, but wake up to it later, when prolonged treatment has been tried in vain. As Dr. Horder says in the paper to which I have referred, "A few physicians earn the reputation of being obsessed by the evils consequent upon septic teeth, but this imputation may be borne with equanimity so long as there exist eminent authorities on rheumatism and arthritis who do not even yet make a critical examination toward this fruitful source of toxic absorption."

The surgeon has now become fully aware of the great danger of septic infection from unclean mouths following important operations, and we are glad to know that the late President of the Royal College of Surgeons, who was one of the earliest to recognize the important bearing of oral sepsis on general surgery, is dealing with the subject in his report to the congress.

The neglect of any due consideration of the mouth and teeth as a probable source of infection, which, as I have pointed out, is evident among the great majority of medical practitioners, is perhaps inevitable, owing to a defect in the present system of medical education. While the student is carefully instructed

in diseases of the eye and ear, and other special parts of the body, those most important organs, the teeth, are neglected. The student, during his hospital training, has every opportunity of acquiring a really astonishing amount of sound theoretical and clinical knowledge, but knows scarcely anything about the teeth. This can only be because the educational bodies have not yet come to realize the important bearing of dental disease on general surgery and medicine.

The student should be instructed during his hospital course, not so much in the surgical treatment of dental disease, which must always be a specialty requiring a long special training, but he should be made aware of the important bearing of oral and dental affections on the rest of the body and its organs, and on the far-reaching effects of oral sepsis; he should be instructed on the kind of diet that is causative of dental caries and the diet that is most calculated to promote healthy teeth; he should be taught to recognize the first signs of that inflammatory condition of the gum margins which goes on to pyorrhea with all its severe and widespread constitutional effects, and he should also be instructed in the pathology of caries of the teeth—and these studies should be made compulsory. It may be said that such training is provided in the dental departments of the hospitals, but in the majority of cases the student only concerns himself with learning to extract teeth, as he believes this knowledge may be useful to him in practice. The student's one desire is to satisfy the examiners, and any subject not included in the examinations is not likely to receive much of his attention. The acquisition of such knowledge would add very little to the burden of the medical student but would be of the highest value to him in practice, and through him to the community.

In the battle against dental disease we want more co-operation, more help from outside. It is not a selfish campaign in any sense, for in promulgating the rules of hygienic living and striving to instruct the public in the methods of securing healthy mouths and teeth the dentist is doing nothing to increase his sources of practice, but rather the reverse, although prophylactic methods will for a long time require skilled attention; but it is an undertaking for the good of the community, and as such should be encouraged and helped by the state, by the medical profession, and by the public authorities in every land. We therefore have no scruples in urging these considerations upon all classes.

The state has largely undertaken the task of dealing with diseases that directly threaten life, but inadequately with dental disease, of which the effects are not so apparent on the surface, but far more subtle and far-reaching, for they are the cause of physical degeneracy and inadequate fulfilment of the duties of life.

The state has dealt more kindly with the child than with the adult. The efforts of education authorities in instituting school clinics have been admirably fostered by the medical department of the Board of Education, and grants for treatment of school children have been made by Parliament; there are already twenty school clinics established in London and between seventy and eighty in other parts of England and Wales. On the other hand, no provision is made for dental treatment under the Insurance Act, despite the fact that a large proportion of chronic diseases are directly due to diseased teeth.

We would ask for more assistance from the great body of general practitioners of medicine, who have an enormous advantage over the dentist and can do so much that he cannot, for our great hope lies with the children; if they are nourished and brought up on sound hygienic principles, having regard to the maintenance of a healthy mouth and teeth, the first great step toward the subjugation of dental disease is taken. The family doctor, from his intimate relations with his patients and from the confidence reposed in him by parents, is in a position to inculcate the rules of diet and cleanliness from an authoritative standpoint. It is well known that

children are so often brought for the first time for dental treatment only when toothache has already indicated the presence of advanced disease.

With his adult patients also, a slight acquaintance with the pathology of pyorrhea will enable the doctor to detect the first signs of this common affection and insist on suitable treatment being carried out.

Professor Osler has said, "You have one gospel to preach, and have to preach it early and late, in season and out of season. It is the gospel of cleanliness of the mouth, cleanliness of the teeth, cleanliness of the throat. These three things must be your text through life." We want this gospel preached in every civilized country, and when its teachings have been understood by the people there will be an improvement in the health and condition of the community which those living under present conditions are quite unable to realize.

As the representative of that wonderful country, Japan, told us at the meeting of the Federation at Stockholm, "Hygiene of the mouth and teeth is perhaps older in Japan than in any other civilized country. This has its foundation less in the recognition of the importance of mouth hygiene for the body than in old-standing religious ideas and obligations, which have gained such a firm hold of the sentiment of the whole people that no one needs to be compelled by special admonition to practice a certain amount of mouth hygiene. Every family without exception has its home altar, usually two, one Shinto and one Buddhist. When the Japanese rises in the morning his first act is to rinse his mouth and clean his teeth automatically with his forefinger and salt; his second act is then to go before the altar and say his prayers—for he may not utter a prayer to his god without a clean mouth." An old Japanese proverb says: "Let the man be brown, but his teeth must be white." Would that cleanliness of the mouth were a religious obligation in our own lands!

We have seen during recent years the introduction of new methods of treatment, many of which have been of great service, such as vaccine therapy, ionic medication and local anesthesia, and a great advance in methods of X-ray diagnosis. In dental surgery, as in the general science of medicine, we often have held out to us the hope of a great discovery which seems to promise unbounded success, yet these new remedies and methods do not fulfil all that is expected of them; still they take their place among the means we possess for the relief of suffering, and are being steadily added to as the years advance. The greatest advances are, however, made when great principles are formulated on which new treatment can be founded.

The greatest of these principles on which all modern treatment is based are the bacterial origin of disease and the antiseptic treatment of wounds. To the great Frenchman, Pasteur, we owe the first of these, the foundation of the science of bacteriology and the true explanation of the nature of fermentation and the life manifestations of micro-organisms.

To the Englishman, Lord Lister, we owe the application of this discovery in the method he evolved, which has probably been of greater benefit to mankind than any discovery recorded in the history of the civilized world. Since the last meeting of the International Dental Congress this great man has passed away, but we rejoice to know that he lived to be fully appreciated and honored both at home and abroad, and to have the great satisfaction of seeing in his lifetime the results of the great benefits he had conferred on his fellow men.

As a noble testimony to the importance of international understanding and mutual appreciation of the obligations which medicine owes to humanity, we must remember that when Lister was suffering from the proverbial disadvantages of a prophet in his own country, when in the full consciousness of the significance of his great discovery he was fighting against prejudice and conservatism, in Denmark Dr. Saxthorpe of Copenhagen, and in Germany Dr. Von Nussbaum of Munich and Professor

Vollemann of Halle proved by the adoption of his methods that the one great system founded by Lister was to revolutionize the practice of surgery.

We know that the old days of professional jealousy and seclusion are past, and that these great international congresses, whatever may be their drawbacks, have been the principal agents in bringing about this most desirable end by encouraging the feeling of fraternity and the comprehension of a common interest among the nations of the world.

The intimate connection between dental and general disease, which has lately been so much brought into prominence, points very strongly to the necessity of maintaining a high standard of medical instruction in the dental curriculum, and a still closer alliance with the whole medical profession, that they may work harmoniously together for the advancement of their common objects.

The difficulties connected with dental education are great, but as knowledge advances it is being less and less looked upon by thoughtful men as necessarily confined to technical instruction; and although we may yet be far from the day when the one portal to all branches of the healing art shall be a medical education, with subsequent special training, this is, I think, the ideal we should keep before us, however unattainable it may now appear. The great law of evolution—the survival of the fittest—must triumph in the end.

In conclusion, I express the sincere hope that from the deliberations of this congress we may arrive at still more perfect methods of treatment and carry farther the application of the great principles of surgery. The outlook is hopeful; the art and science of the dentist is ceasing to devote itself entirely to making good the ravages of disease, and is striving also to prevent its occurrence and improve the physical condition of the race.

The watchword of the day is "prevention," and we hope that while the care of apparently inevitable disease must largely occupy our attention, the best efforts of all practitioners will be directed to prophylactic methods, and that they will succeed in relegating to the past many of the evils we now look upon as the common lot of humanity.

CORRESPONDENCE.

BOTTLE FEEDING AND MALOCCLUSION.

To the Editor of the Dental Cosmos:

Sir,—In Dr. H. A. Baker's discussion occurring on page 1076 of the September issue of the Cosmos he states: "My own son, who was a bottle-fed baby, developed a class III case of malocclusion, which brought about the use of intermaxillary elastics." In telling of the treatment he describes the treatment of class II cases, since he says, "I studied the case quite a good deal, and set about to bring the *upper teeth back* and the *lower teeth forward,* as I was not willing to sacrifice any teeth."

Does he mean a class II case instead of "class III," or is his description of the treatment incorrect?

Is the tendency greater to develop a class III case of malocclusion instead of a class II case with a bottle-fed baby?

Respectfully,

V. B. Souby.

Murfreesboro, Tenn., September 5th.

Proceedings of Societies.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-sixth Annual Meeting.

First Day—*Afternoon Session.*

The forty-sixth annual meeting of the Dental Society of the State of New York was opened on Thursday afternoon, May 14, 1914, in the assembly room of the Educational Building, Albany, N. Y.

The president, Dr. W. W. Smith, Rochester, called the meeting to order at 2 o'clock.

The Rev. Dr. Dugan, Albany, invoked divine blessings on the deliberations of the society.

Dr. A. P. Burkhart moved that the calling of the roll be dispensed with, also the reading of the minutes of the last annual session. [Motion carried.]

The vice-president, Dr. A. M. Wright, Troy, took the chair, while the president, Dr. W. W. Smith, read his annual address, as follows:

President's Address.

By Dr. Wm. W. Smith, Rochester, N. Y.

A cordial welcome is extended to all in attendance at this, the forty-sixth annual meeting of the Dental Society of the State of New York.

MEMBERSHIP.

The fivefold increase in membership which was established last year presents an unusual aspect to the proceedings of this society, and suggests some changes in its policy. On account of the adoption of the reorganization plan, it has been particularly interesting to note the attitude of the members throughout the state toward society matters. It was predicted by some that it would cause a decrease in interest and members. Observation, however, has led to the belief that the reverse is the case, except in one or two of the districts; the reports show that since the last annual meeting many new members have joined the society, and in addition to this, many who had neglected to pay their dues through lack of interest have paid in full and have been reinstated.

The figures seem to indicate only a small increase in the membership of the State Society. This is due to the fact that, when the reorganization plan went into effect, several of the districts reported the names of their members and paid the dues of many who were delinquent. This year those who have not met this obligation were dropped from the list; their indifference was of a chronic nature, and not due to the society's change of policy.

DISTRICT SOCIETIES' ACTIVITY.

An understanding of the various activities throughout the state—the scientific research movement in the First and Eighth districts, the educational campaign of the Second and Ninth districts, and the free dispensary work of the Seventh and other districts—should stimulate all of the districts to a healthy emulation.

THE BULLETIN.

The *Bulletin,* which was published this year for the first time, was inaugurated

for the purpose of conveying a knowledge of these activities to all parts of the state, with the intention of producing this interrelationship, with its co-related results of arousing the interest of inactive members and of encouraging others to become members. It had the further purpose of conveying the same spirit to other states throughout the Union, which is in accord with the sentiment expressed by the National Association of State Officers. The mutual benefit which is derived from this interchange is an important consideration.

A vast amount of work was necessitated in the publication of this initial issue of the *Bulletin*. Future issues, if there will be such, will require far less effort, as the district secretaries and others concerned will understand just what is expected of them. This will further be reduced if the work is in the hands of a regular appointed committee, who would have all the details in charge. The cost this year was also greater than future issues will require. This could be reduced by changing the style of the pamphlet, or by the addition of a few high-class selected advertisements, or by both. These details could be determined by the Executive Council.

This publication, if continued, may evolve into or at least encourage a larger and more important field of operation, if the sentiment manifested at present continues. There is a growing tendency toward the control of journalism by the profession. The manufacturers and dealers in dental supplies are a valuable adjunct in the development of the profession and have served us faithfully in the matter of periodical dental literature, but the time is undoubtedly coming when our journalism must be placed on a broader professional basis.

ORAL HYGIENE WORK.

The work of the Oral Hygiene Committee is deserving of special commendation. A scenario for a motion-picture film entitled "Oral Health," which is highly interesting and educational, has been presented to the Executive Council for its approval. This has already entailed a vast amount of work by the committee, and if completed will mean much more. The committee is now hoping to be able to carry this work to completion, and produce the completed film for its initial exhibition at the meeting of the National Association in Rochester in July.

This committee is also maturing other plans of educational work, which will receive its more active attention after the motion-picture film is completed. It should receive the hearty co-operation of the entire society.

PROPOSED REGULATION OF MEMBERSHIP IN DISTRICT AND STATE SOCIETIES.

There is a discrepancy between the charter and the by-laws of the society. The latter provide that one cannot become a member of the State Society unless he is a member of the society of the district in which he practices. This imposes a hardship on many who practice in one district and reside in another, as is the case notably in the First, Second, and Ninth districts.

This condition should be obviated by allowing the choice of membership either in the society of the district in which one resides or where one practices, but no one should be an active member in more than one district.

In this connection, it is suggested that the fact be borne in mind that all of the districts are simply units of the State Society. Active membership should imply or include associate membership in every other district *without dues*. It should be the privilege of every member of a district unit to attend the meetings of every other unit, and enjoy all privileges except those of voting and holding office. Associate membership *with dues* should be open only to non-members of the State Society.

An act of the Legislature provides that the components of the State Society shall be "under the name of the district dental society of the respective judicial districts where they shall be located." This is not in accord with the present spirit and

letter of this society. A more comprehensive wording would be "The ——— District of the Dental Society of the State of New York," designated by the respective judicial districts. It would be well to consider the matter of making such change at an early opportunity.

PROPOSED CHANGE IN PLACE OF MEETING.

On account of the increase in membership and other conditions of this society, it seems advisable at this time to consider the matter of making it possible to hold the annual meeting in some of the other large cities of the state. This would have a tendency to promote the healthy rivalry which is necessary to growth. It would avoid stagnation, would relieve certain local men of burdens which have been imposed upon them year after year, and would arouse to activity a new element in each section where the meetings may be held—the indifferent, and especially the younger men, would take a direct interest in the affairs of the society. This plan was adopted two years ago by the New York State Medical Society after more than a century of meetings in Albany, and the benefits have been beyond the expectations of its members.

PROPOSED OFFICE OF PRESIDENT-ELECT.

Under the present plan for the election of officers of this society, the vice-president is expected to be elected to the presidency. This, however, is not always the case, and the vice-president cannot make such asumption. He must remain in the background, and make only such preparations as may be done without observation; so, at the time of his ascendency, he at once assumes arduous duties with only a partial preparation. This could be avoided by establishing another office, which may be designated as the president-elect, such an officer to be elected one year in advance of his term as active president. He would have one year then in which to make active and definite preparations, so decreasing his burdens and increasing his efficiency. The American Medical Association has pursued this plan for the last five years, and finds that it works decidedly to the advantage of that society.

Specifically, the operation of this plan would be in this manner: For the first year of its adoption, the active president would be elected as usual, then a president-elect and a vice-president would be elected. In subsequent years, the president-elect would succeed to the presidency automatically, and another president-elect would be selected in the usual manner, presumably by the advancement of the vice-president.

PROPOSED ABOLITION OF NECROLOGY COMMITTEE.

The work which has hitherto been done by the Necrology Committee of this society is rendered impracticable and unnecessary by the increase in membership and the affiliation of the district units. These reports will appear in the Transactions under the reports of the district secretaries.

ALTERATION OF RULES REGARDING CHANGES OF BY-LAWS.

There is a provision in the by-laws which prevents any change being made in them until one year after the presentation of the proposition for such change. This is unnecessary, and in some cases militates against the best interests of the society. Twenty-four hours should be sufficient time for the consideration of some of the proposed changes that should be made. It should be provided, however, that if any member objects, action on a proposed change must be deferred until the next meeting.

LEGISLATION IN REGARD TO DENTAL PRACTICE.

The subject of legislation has received considerable attention during the past year. The paper on this subject which was presented by Dr. Ottolengui one year ago, and the appointment of a special Legislative Committee to consider the suggestions made in that paper and to

make report to the Council at this meeting, has elicited considerable discussion in several of the districts, and interest in the subject has become quite general throughout the state. Illegal and unethical practice is so much in evidence that serious consideration of the subject is its natural outcome. Notwithstanding the persistent and arduous efforts of the Law Committee, the situation is such that it has not succeeded in remedying or even in checking this condition.

There is a general feeling of disappointment that the bill known as the "Seeley Dental Bill," which was presented to and approved by both the Senate and Assembly, should not have become a law. This bill clearly defined dental practice, and contained provisions which were approved by the committee and others interested. It was supported by the better class of dentists; it was opposed by the illegal practitioner and the charlatan.

This bill did not provide for annual registration of dentists, which phase of the subject has been generally discussed during the year. This discussion has resulted quite unmistakably in a growing sentiment in favor of some form of annual registration, with a fee of one or two dollars, thus providing for the maintenance of an executive officer, and deputies, if necessary, to attend to registrations and prosecutions.

It seems important that the Executive Council continue this special legislative committee, with instructions to consider the actions taken by the district societies, and with discretionary power to formulate a bill which shall be approved by the regular legislative committee and presented at the next session of the legislature.

Present conditions seem to demand that protective laws be enacted, and, if they are necessary, care should be taken that they are justly framed. We must, however, not lose sight of the fact that law in itself does not promote either real efficiency or ethical practice. Before the enactment of any dental law, the public from necessity protected itself, and only the fittest survived. A college course is not a hardship, but the easiest way in which to obtain the knowledge that one must possess if he ranks high in professional attainments. College degrees which represent honest endeavor are a valuable asset; one cannot possess too many of these, but a degree obtained solely because the law demands it will act like a millstone, and tend to drag its possessor into the seething current of commercialism. Proper legislation should receive careful attention; but what is vastly more important is *efficiency*.

Statements which have seemed extravagant have been made in the past by men high in authority regarding fatalities and suffering caused by unskilful and dishonestly performed dental operations. And even worse than this is the neglect of the unfortunates who cannot pay for the services of the few who are skilful.

CO-OPERATION WITH THE MEDICAL PROFESSION URGED.

Today we face with humiliation the fact that these things and more are true. Large numbers of the medical profession are coming to realize that, without proper mouth conditions, they cannot produce and maintain health, and that the average dentist as well as the average physician is not alive to the significance of existing conditions.

The two professions are inevitably converging. Let us remove every obstacle from the path of progress of this convergence, for only by unity can the two professions attain the highest proficiency and give to humanity its due.

First, let us have done with petty jealousies and unreasoning contentions; then let us make ourselves worthy of recognition, and capable of intelligent argument by scientific and general advancement. The line of demarcation between the professions is a mirage, based on ignorance, which will vanish automatically as each approaches the other through the attainment of knowledge.

SCIENTIFIC RESEARCH.

There is a group of self-sacrificing men, unfortunately small at present, but growing larger every day, who by their skilful and patient efforts are endeavoring to place dentistry in the forefront of the learned professions. This group should be augmented by every capable and earnest worker; its individuals are deserving of the hearty admiration and unqualified support of everyone.

Dr. Weston A. Price has made contributions to both the medical and dental professions which are of inestimable value. His plans for the future will result in even greater accomplishments, if the work of the National Research Commission receives the support which it deserves.

There are men in our own state who are doing valuable research work. This work should be encouraged, and its scope extended by placing it in close harmony with the National Research Commisssion, so that its valuable results may be spread broadcast throughout the profession. The greater need today is not so much the education of the public as it is the education of the dentists themselves. In general, the thinking public is in advance of the dentist, and is demanding the care which only a few have the ability to give.

SUMMARY.

To summarize the foregoing suggestions, these recommendations are made:

(1) That a bulletin be published by this society, either annually or semiannually, under the direction of the Executive Council, its details to be in the hands of a publication committee appointed by the Council.

(2) That section 4 of the By-laws be changed, providing that active membership may be held either in the society of the district in which one practices or of that in which he resides, and he shall not be an active member in more than one district.

(3) That the By-laws be changed so as to make it possible that the meetings of this society be held in some cities other than Albany, at the discretion of the Executive Council.

(4) That another office be created, such officer to be elected one year in advance of his term as active president.

(5) That the Necrology Committee be discontinued.

(6) That the By-laws be changed so that a recommendation presented without objection at the first session of the Executive Council may be acted upon at a meeting held not less than twenty-four hours subsequently.

(7) That the special Legislative Committee be continued during the current year, with instructions to consider the actions taken by the district societies, and with discretionary power to prepare a bill to be approved by the regular Legislative Committee and presented at the next session of the legislature.

We look with pride upon the achievements of this society. It has always maintained a high professional standard, and has not been lacking in constructive work. Stagnation at this time is inconceivable. The New York State Dental Society, with its district units working harmoniously, must and will advance.

Dr. WRIGHT appointed the following as the Committee on the President's Address: Dr. Louis Meisburger, Dr. A. W. Twiggar, Dr. W. B. Dunning; after which the president, Dr. Smith, resumed the chair.

The next order of business was the report of the Business Committee, by Dr. H. J. BURKHART, chairman, who reported the program for the day.

Dr. BURKHART moved that the president of the society be directed to send telegrams of greetings and good wishes to both Drs. Jarvie and Hofheinz, who were just sailing for Europe on account of ill health. [Motion carried.]

Dr. SMITH. We are honored with the presence of the chief executive of our state. It is my pleasure to present to you Governor M. H. Glynn, who will address you at this time. [Applause.]

Governor GLYNN. Mr. Chairman and brother alleviators of human suffering and human pains,—Somewhere in one of his poems, Robert Burns calls toothache the "hellest of all diseases." I suppose you all know that poem, and, as saints, are the only people in history whose intercession and interventions are at all efficacious in saving people from the tortures of hell. I suppose, poetically speaking, according to Burns, that all dentists are saints. I know little or nothing about dentistry, but I know also that most politicians make the best speeches about the things of which they know least, for the reason that they are not hampered by facts and can give full swing to their imagination; but I am not going to try that today. I know nothing about dentistry, and do not intend to try to make a speech about it. I know this, however, that despite the fact that you made me governor, that despite the fact that clothed as one is in robes of tissue paper, wearing a crown of pasteboard, and sitting on a throne made of reeds and shaken by the winds, still that glory does not relieve one from the necessity of visiting the dentist, and I find my bills just as big when governor as when I was a private citizen.

I suppose there are a lot of things that the state should do for dentists. Dr. Downing tells me so every time the legislature meets, and I suppose Dr. Downing knows. On the other hand, if the state did everything that every society of New York state wants, all the laws passed each year by the legislature would fill this room if brought here. Still I recognize the fact that, as an army moves on its stomach, so our people move to a large degree on their teeth. I look upon dentistry as a branch of medicine. I believe that the same precautions thrown around medicine should be thrown around dentistry. I believe that by every attempt toward stopping the pain and the ravages caused by dental caries, you make yourselves eligible to the calendar of sainthood; if not religious sainthood, at least the sainthood of humanitarianism and good brotherly feeling. [Applause.]

Dr. A. S. DOWNING, Albany, assistant commissioner of education. The governor has made reference to legislation which should be enacted in my judgment for your benefit. I would modify that statement by saying that in my judgment this legislation should be enacted for the benefit of the people of the state. [Applause.]

Since this meeting has been in session, I have been asked time and again why the governor vetoed the dental bill, and I am going to tell you the reason. That is what you want to know. The bill did not pass the legislature early enough in the session for the governor to give full consideration to certain features of this bill which were presented to him as being detrimental to the good of the public. He did veto a bill which from every reason, as governor of this state, as a politician, as conserving the professional interests of dentistry and the public health, he ought to have signed; in spite of his desire to sign the bill he did veto it. That bill was known as Assembly Bill 1172. Yours was Senate Bill 1480, and he vetoed this also. What we need is a definition of what constitutes dental practice. We have the practice of medicine defined in the medical law, and we know when a man violates the medical law, because he must not do certain things which are known as the practice of medicine. Your bill proposed to give a definition of dentistry, but at the very last, after it was in his hands with some hundred-odd other thirty-day bills, and 'way down on the calendar, opposition arose to the bill because there was found in the definition this clause—"or maintaining a dental office for such practice." That is, practice of dentistry, in one instance at least, shall consist of maintaining a dental office for such practice. The governor simply had not time when he reached the bill to give it due consideration. It was put up to the governor that, if that bill became a law, all of the dental offices in this state maintained by men who are not dentists would be put out of business. This question was put before the governor as a business proposition, and he is a busi-

ness man, but he had no time to consider the question. You could not get near him—very naturally—for a week or ten days, because he had to give consideration to these numerous bills. Here is the proposition: If this gentleman employs in an office only legal practitioners, and calls it—we will suppose it here in Albany—the Pearl Street Dental Parlor, and there are no practitioners operating in that parlor except legally licensed dentists, is it fair to put that parlor out of business?

VOICE. Sure.

Dr. DOWNING. You say "Sure," and I say "Sure," because I am administering the professional laws, but put that up to a man suddenly, one who does not know the reasons for the opposition to it, and he cannot help stopping to consider the question. The governor's position was that he wanted more time before he signed that bill; he wanted to know more about it. There is no evidence that he would not sign it another year, but the trouble is that you yourselves, this dental society, do not know what is going on in the legislature. That is where the trouble lies. You have an executive committee and a law committee to draft a bill, and in that bill are included certain things which the department wants, and we indorse the bill unqualifiedly, and the department gets the blame for the bill not being passed and signed. The dental society does nothing when it comes to advocating the bill; they rely on the Educational department to keep posted. I insist that your legislative committee are the people to be on hand here, and know what is going on. [Applause.] The trouble is that the rank and file of the dental profession in this state seem to take no interest in this matter. There should have been in the governor's hands, as soon as the bill passed, thousands of letters from all over this state indorsing this bill and asking him to sign it. As it was, the opposition was on hand all the time. You notice what the Educational department said in the memorandum to the governor. They sent over for a memorandum on the bill, and I wrote the memorandum, which was to the effect that—"The state Educational department unqualifiedly is in favor of the enactment of this bill into law, and most respectfully urges action by the governor, for certain reasons. This has the approval of the state department and all dentists—the state dental society—interested in the conservation of the public health."

You gentlemen rightfully say, If the state Educational department is administering the law, why could they not get this bill signed? It was not our bill; it was your bill, and we did more to pass this bill than you did. These are the facts in the case. Some of the Legislative Committee never knew that the bill was before the governor;—I think there is a member of this committee present who did not know what was going on. What you want is live men who will work.

Four years ago, there were certain measures that I believed would be good for the dental profession, and that should be enacted as law. One was the requiring absolutely four years of high-school study before admission into the dental schools. We are behind other states in that respect. We allow men to matriculate with three years of high-school training, and let them make up the fourth academic year in the dental school. You know that it is impossible for men to do academic work and dental work at the same time. Then we wanted in this bill another proposition: If a man secures a dental license before entering a dental school by fraud in any way whatever, he is guilty of a misdemeanor. As the law reads now, a man can go before the court of appeals on that point. We took away the license from a man who stole a preliminary educational certificate, entered a dental school, passed through the course, passed the state licensing examination, and began to practice dentistry. In the course of a few years it developed that this man had secured his preliminary educational certificate by fraud. The case was brought before the dental board, who recommended revocation of the license. This

man showed a letter from a New York lawyer stating that he was not guilty of unprofessional conduct, and that a license could only be revoked for unprofessional conduct in any profession. The Board of Regents held that he was guilty of immoral conduct when he stole the certificate and engaged another man to take the preliminary examination for him. That case was taken to the court of appeals, and it is going to cost money to prosecute the case, and you will wonder next year why you do not get large revenue from the excess of dental fees over expense of administration. Now, we want in the law a clause that would specify that if a man is guilty of fraud in procuring such a certificate, his license can be revoked.

Another clause we wanted in the law was a provision to license men in New York who have been practicing twenty-five years in another state. It is only fair that a man who has practiced in the state of Pennsylvania or Illinois for twenty-five years as a reputable practitioner should come to this state and take the practical examination only, and, if he passed the board examination, be given a license to practice in this state. That clause was in the bill which the governor vetoed.

I want to tell you frankly, therefore, why the governor vetoed the bill: First, because of the definition of the practice of dentistry contained the clause I referred to, and he did not have time to give a full, frank, open consideration to that clause. There was no time for a hearing. If we could have obtained a hearing, we could have produced strong arguments, and I believe he would then have signed this bill. This society was not informed of the contents of the bill and did nothing to speak of either for its passage or toward its being signed by the governor. I think the dental society makes a mistake when it does not keep its entire membership informed as to the dental legislation before the legislature and when such legislation gets into the governor's hands. Every member of the society should know about the bill, and what is to be done. I am frank to say that next year we shall put in a department bill which will contain these clauses, which in our administration for the benefit of the public and for your profession we believe to be absolutely right. We have tried for four years to get these clauses in the general dental bill which has been introduced by this society, and which has never been enacted into law—and you are suffering every year because of it. Next year, if I am alive and in my present position, I propose to submit to your legislative committee a proposition which we believe right and which you have acceded to year after year, amending the present statute to contain these clauses at least. We will put in, if we can to the satisfaction of everybody, a definition of dentistry, as we have a definition of medicine, and such other provisions as will tend to better administration and better conservation of the public health; we will try to eliminate from our bill everything that has any reference to the amendment to the penal code. If that needs to be amended, it can be amended afterward. [Applause.]

The next order of business before the society was the reading of a paper by Dr. John J. Cronin, deputy health commissioner of New York City, entitled "Municipal Control of Dental Clinics."

[This paper is printed in full at page 1150 of the present issue of the Cosmos.]

Discussion.

Dr. H. L. Wheeler, New York. I wish first to express my appreciation and that of the society of Dr. Cronin's valuable paper, and of the courtesy of Dr. Goldwater, who is the health commissioner of New York, in sending him here. I trust that Dr. Cronin will be able to have sent, to the members of the dental profession who wish them, copies of the monthly *Bulletin* of the New York City department of Health, which will keep them posted on the progress of the various services, including the dental department, carried on in New York City. If the dentists were posted on

these activities, perhaps their enthusiasm would be greater, although I think it is very satisfactory now. This most interesting paper has dealt exclusively with the work of the division of Child Hygiene, and I wish to call attention to the fact that when dental service was established in the New York City department of Health, we did not stop with the care of the children, although that is the most important feature and received the largest grant of money and the greatest amount of service; but in order to be thorough and complete, the division of communicable diseases had a dentist connected with it, so that those unfortunates who were attacked by tuberculosis and other diseases, and who had to be sent away for preventive treatment, might, among other things, have their mouths put in a thoroughly hygienic condition before going away to seek health. I have here a report of the work that has been done in that department. During the year one dentist attended to 2372 cases, 2066 of which went to the Otisville preventorium managed by New York. I mention these figures in order to show how thoroughly the department of Health of New York City has gone into this matter. What is really needed now is extension of the service. Dr. Cronin did not tell you that seven years ago forty per cent. of the children in New York City were retarded in their advancement in the public schools because of physical defects, and after seven years' work by the division of Child Hygiene, this percentage has been reduced to eighteen per cent., showing what can be done in this work. To make the figures more concrete, there are about 700,000 or a little more public school children in New York City, and according to statistics, about eighteen per cent. of these are retarded or become "repeaters" because of physical defects; in other words, about 140,000 public school children in New York City are unable to go forward to the grade expected of them, or remain in the grade in which they have been for a year, because of some physical defect. Of these 140,000 about forty per cent. exhibit defects of the oral cavity. In concrete numbers that amounts to 56,000 of the children of Greater New York being kept back because of defects of the mouth and teeth. It costs the state about forty dollars per year to instruct children who have been kept back for a year in the public schools. This would make the expense to the city of New York due to defective teeth about $2,240,000 a year. This is appalling. I looked over the figures several times before I could convince myself that they were correct. The city of New York is a generous spender, and my experience is that what the city does it does well; it does not do it in a niggardly fashion, but is willing to spend what is necessary to do the thing right, and we find the division of Child Hygiene, which has to deal with public school children, spending $651,195 directly to look after the physical welfare of the school children, and wasting over $2,000,000. The argument of the speaker, that if anything is worth doing at all it is worth doing completely, I believe to be reasonable. The dental service in the city of New York at the present time costs, roughly speaking, $24,000 per year, and the carious teeth and diseased mouths of school children cost the city of New York a sum so appalling that we hate to mention it. Therefore, on the ground of economy alone, something will have to be done to save the taxpayers, let alone the people and children who are more important than the taxpayers.

Another point. It has been very difficult to obtain figures showing that the actual advantage to the physical welfare of the children is due to dental service in the department of Health, but Dr. Cronin has shown that 20 per cent. of the absences occur among children who have been to the dental clinics and had dental work done, while the absences on the part of those who have not been to the dental clinics nor received dental service amount to possibly 45 per cent. Here is a concrete fact that we can take home—a difference of 25 per cent. in favor of those who have had the service of the dental clinic. Besides the dental

clinics, we have Bellevue and the Allied Hospitals in which volunteers are carrying on the work. At Bellevue Hospital over 5956 operations were performed last year. These included nearly one hundred operations for fracture of the mandible and various diseases of the bones of the jaw, such as caries and necrosis. This is another case illustrating economy. Before the dental profession gave the dental service in Bellevue, it was customary that a patient with a fractured jaw had his jaw bandaged daily, and was kept in the hospital under the constant care of attendants for from six to ten weeks. Now the dentist takes the impression, and within two or three days a splint is placed on the jaw, and the patient goes about his business, coming back to the hospital two or three times weekly to have the mouth thoroughly dressed and washed. Cases treated in that way cost the city one-tenth of the amount they used to cost before the establishment of dental service. I am calling attention to this, because when you go before your city fathers or mayors and ask for funds to carry on this work, they first ask as to expenses, and by the illustration just given it can be shown how money can be saved by the community.

In the Harlem Hospital 1556 operations were performed last year; in Fordham 847, in the Gorham 700; and this includes a large list of operations for fractures, etc. This work is done by the appointment of men of the staff of Bellevue and Allied Hospitals, whose positions are rated the same as those of members of the medical profession. In the medical department visiting physicians and internes are assisting; in the surgical department visiting surgeons and internes are assisting, and in the dental department visiting dentists and internes —one person being there constantly as an interne. In the St. Bartholomew, which is the oldest hospital in New York, they employ two men on small salaries; one man who works every afternoon in the week receives six hundred dollars; the other, who works two afternoons each week, receives three hundred dollars. In St. Bartholomew 5009 individuals were treated, 3216 being children, and 1793 adults. The dental operations performed in this clinic, with one man working three hours every afternoon and another working three hours on two afternoons, amounted to over 7340. That is a good deal of work, and it included over 1200 amalgam fillings and nearly 600 cement fillings.

I would like to call your attention to one or two more features in the report of the department of Health. As I have pointed out, there are 700,000 children in the public schools of New York. According to the statement made by Dr. Cronin, the children are being treated in about four per cent. of the schools. The department of Health in the first year of the establishment of the clinics, when there was necessarily more or less trouble due to lack of precedents, recorded 87,922 operations, of which over 21,000 were fillings. And yet, as I have pointed out, not ten per cent., perhaps not even five per cent., of the needs of New York City alone are covered. The work done by the bureau of Child Hygiene in their attempt to limit the service to children in the primary grades seems especially commendable, because, as these children grow up, their need of dental service will be practically eliminated, and in the course of years the needs of this service in New York City will be gradually reduced. By the adoption of this intelligent scheme, I believe that in time, even with our present inadequate means, the city of New York will advance considerably beyond its present status in the matter of dental care.

I wish to add in closing, that judging from my experience of about twelve years of active service in this work of oral hygiene, while it may be desirable for the public schools to have control of the physical examiner who shall not only examine the mouths but make further physical examination of the children, the work of caring for their needs will for all time devolve upon the department of Health, and it is my opinion, based upon careful observation of the situa-

tion, that this is the only plan that will solve this problem. Dental work must be done along with the work of caring for the eyes, nose, throat, and ears under the direction of the departments of health of the various towns and cities.

Dr. W. A. Howe, Rochester. I was greatly interested in the presentation of the work done by the city of New York. I would like briefly to tell you some of the work along the same line which was done by the state of New York during the term in which I was deputy commissioner of health. Some three years ago it was my privilege to speak before one of your meetings in Rochester, when I found indifference on the part of the dental profession to public health matters, and it seemed to me a pity that men of your intelligence took no more active interest in matters pertaining to public health. I hope the time is not far away when you as a profession will appreciate more keenly the close relations which exist between dental equipment and public health. It has been indeed gratifying to me to see the work progress so rapidly in the past few years. Within a few months of the meeting referred to, the commissioner appointed three of your members as lecturers for this state. I dare say that some of you are familiar with the importance of the work that has been done. As a result of that work, there are now eight or nine cities maintaining dental clinics. We have today a fully paid lecturer devoting his entire time to teaching to the children of the state, and I may say also to the profession of the state, the importance of this branch of public health. It has been one of the popular lines of our work in the state department of Health. There is no one class of work so tempting throughout the state as this field. I believe that you as a profession are rapidly approaching the time when you must consider the great importance of your position in preventive medicine. Preventive dentistry has come to stay; you are going to be able assistants to the medical men, who in turn will assist you. The convergence of the two professions of which your chairman spoke is rapidly coming closer, and as a medical man I am particularly gratified to see such a willingness of co-operation and desire to get together to work out the ultimate solution of this important problem. To me it would seem as though you dentists may well consider assisting the medical men in the care of the individuals you meet, by teaching the mother, perhaps, the care of herself in the prenatal period, because I believe that much can then be done by which the health of the prospective child is injured. I believe that this is a question, as has been said, of education—of truth, as one of the speakers emphasized, and the men who must bear the truth to the people are the members of the dental and medical professions. In this state the great department of Health until the present year had at its disposal $278,000 with which to do its entire work. When I listened to the figures cited by Dr. Cronin in speaking of New York City alone as having an appropriation of some five millions of dollars, I wonder that the state department of Health could exist with its mere pittance of less than three hundred thousand dollars. For oral hygiene we have been able to spend only about four thousand dollars a year, and yet we have interested the people of the state; our work is growing, and it is bound to grow still more, but you dentists are derelict in the same sense, in the same way as we medical men are derelict. You should take an active interest in matters pertaining to legislation; you should have some prominent members of your profession in the legislative halls,—members familiar and conversant with the needs of your profession, so that what has happened during the past session would not be so apt to happen. If we could have a few good dentists and a few good physicians as members of both houses, much of the trouble of securing appropriations would be solved, for without money we can do but little. I therefore hope that you dentists will take at least sufficient interest to see that the right type of men,

who will look after your appropriations, your items, are sent to the legislative halls.

The great principle that actuated Dr. Cronin's article was that of prevention. It is the same in medicine; the time is rapidly coming when we physicians are going to be sought after to tell our *clientèle* how to prevent disease. You dentists will be expected to tell to families how to prevent disease conditions in the teeth of their children. This great wave of preventive medicine has come to stay, and it is going to be but a short time when you as one profession and we as another will be co-operating. A great field is being opened to you in the line of medical examination of school children. This is a wonderful field that embraces examination of the eyes, ears, nose, throat, and teeth. It is a surprising fact—and that is the only point in which I differ with Dr. Cronin—that there are many medical men in the state of New York who do not recognize the importance of the permanent first molar. Further than that, I believe many dentists of the state are so unmindful of the importance of that tooth as to advise extraction. Within a few months I have had a mother come to my office with a child with a diseased permanent first molar of which the dentist had advised extraction. I said, "Madam, that can hardly be possible!" She replied, "Yes, it is possible." Thus, we need to educate not only parents but members of the professions that it is as important to preserve these teeth as it is to have a clean mouth, because a clean mouth and a good dental equipment means so much not only to the present condition but to the future health of the child.

I shall be always interested in the good work which you are doing, and shall welcome a closer relation between the dental profession and that to which it is my privilege to belong.

Dr. F. W. Low, Buffalo. My remarks perhaps do not belong in this discussion, but I want to make them just the same. If the members of the dental profession would do just a little lobby work, we should not have to go to Washington and Albany as often as some people think they do. We do not even advise our legislators that we have any interest whatever in what they are doing. Whenever the state or Union legislatures propose anything the opposing factions are all there, but we stay at home and do not even take the trouble to write a letter and put a two-cent stamp on it. I have in my pocket a letter which I received yesterday from the representative from Buffalo, saying that the letter he had received was convincing, and that he did all he could to defeat the bill proposing to revive the Low patents on crowns. If every member would do as I did, such bills would be prevented, but we do nothing. I hope that members of this profession hereafter, besides the legislative committee, will take the trouble at least to spend two cents to mail a letter to their representative stating some convincing reason why a certain bill should or should not be enacted.

Dr. C. N. Johnson, Chicago. I feel some diffidence in taking the time of the society, yet I am so full of this subject that I cannot allow the opportunity to pass without just a word. First I wish to express my appreciation of the paper we have just listened to. I have been engaged in this work for some time in our state, and there is a great deal that I could tell this association about the work done there. However, I simply want to take off my hat to New York for what you have done. You have set a pace which it will require some energy for other states to follow.

The statistics in this paper are convincing; so much so that it requires no further argument to prove the fact that dentistry is a community asset. We forget this too frequently. Another thing in this connection is that we forget that the fact of this being a community asset should be impressed upon the people receiving this service. Our humanitarian ideas in regard to the relief of pain are magnificent, but we must have a care that we do not do harm while doing good. I believe when work of this kind is done for people, the parents should be impressed with the fact that it is done be-

cause it is a protection to the community. This should be emphasized more than the fact that it is charity service. I believe there is danger in doing too much charity work. Our charitable organizations in this country, in my opinion, do nearly as much harm as good. I believe we should relieve suffering independently of any other factor; if adults or children come to one of these clinics with pain, that pain should be alleviated. But there is danger in the city or state assuming a function which properly belongs to the individual, and these people should be impressed with the fact that this is done as a community movement; that we are doing it for the protection of the children and not for the individual himself. We have too many people come to us for charity work, and if we begin to do this work for every individual, we develop a dependence that leads to a certain amount of paternalism. The moment the individual expects something for nothing, he begins a disintegration of character that you cannot correct.

In regard to the remarks made by Dr. Downing as to the attitude of the state organization toward state legislation, I wish to say that we have that down to a very fine point in Illinois. You can teach us a lot of things, but you cannot teach us how to get a bill through the legislature. When we have an enactment up for consideration there, we have fifteen hundred men behind it in the State Dental Society, and we emphasize the fact that it is legislation for the benefit of the people. We never say that it is for the benefit of the profession, but for the public. I would not support any bill that was for the benefit of the profession and not fundamentally for the benefit of the people. When this legislation is proposed, we have an organization in Illinois which swamps the members of the legislature with a wave of mail that floods the capitol at Springfield. One or two letters, as Dr. Low said, will not do any good, but if your governor had received from fifteen hundred men a short, clear-cut statement of the necessity of signing your bill, that bill would have been signed.

Dr. Cronin (closing the discussion). I merely want to thank the association for the kindly way in which my paper was received, and express my appreciation to Dr. Howe and Dr. Wheeler for their generous discussion. I think Dr. Johnson has again hit the nail on the head in this matter, as he did in the matter of the permanent first molar, by saying that this movement is for the benefit of the community. When we neglect to do for school children what we know they need, we are guilty of criminal neglect, and the amount of money that the state is paying for irresponsibles, represented by the insane, poor, and paupers, represents, to my mind, almost the exact proportion of the amount of money they should expend on the care and physical well-being of school children.

If in any way I have inspired you, or succeeded in interesting you in this great widespread new theory of biological engineering, and if you will take this matter up and preach the gospel wherever you see it waning, I have fulfilled my purpose.

Motion was then made and carried to adjourn until the evening session at 8 o'clock.

Thursday—*Evening Session.*

The meeting was called to order Thursday evening at 8 o'clock by the president, Dr. Smith.

The first order of business was the report of the Committee on Fellowship Medal, Dr. A. L. Swift, chairman, as follows:

Report of Fellowship Committee.

Mr. President and Members of the Dental Society of the State of New York,—The Fellowship Committee would respectfully report that they unanimously recommend that Dr. William Carr of New York become a Fellow of the Dental Society of the State of New York.

Arthur L. Swift, *Chairman,*
William J. Turner,
Augustus R. Cooke,
Louis Meisburger,
Rudolph H. Hofheinz.

PRESENTATION OF FELLOWSHIP MEDAL.

The President asked Dr. Swift and Dr. Turner to escort Dr. Carr to the platform, after which he presented the Fellowship medal to Dr. Carr, as follows:

The PRESIDENT. *Dr. Carr,*—The Fellowship Committee have deemed you worthy to become a Fellow of the Dental Society of the State of New York. In so doing they have recognized your long, arduous, and self-denying service in upbuilding our profession. Your efforts to raise the educational and ethical standards of the profession of dentistry, and to protect it and the public from unprincipled pretenders, are well known and appreciated.

The deprivation of society and home pleasures, the time and money sacrifice, and, vastly more than these, the sacrifice of health, are all considered. The part you have taken in building up the college which your name honors as its dean and the work for humanity you have accomplished in your surgical services are also considered.

By virtue of the office I hold, it gives me pleasure to present to you this medal, and declare you a Fellow of the Dental Society of the State of New York.

Dr. CARR, in accepting the medal, spoke as follows: *Mr. President and fellow members of the Dental Society of the State of New York,*—I am profoundly impressed by the sentiment expressed by our president and keenly appreciate the great honor conferred by this presentation, for which I thank you sincerely. This is an honor entirely unexpected, and one of which any member of the profession should be justly proud. I believe that this presentation is made as an expression of confidence and appreciation of my efforts in the construction and enforcement of the dental law. I shall not attempt to take up your time with a lengthy history of our committee work, but will simply outline without embellishment some facts that may interest you, and give some data to the future compiler of dental history.

Dr. Carr then read the report of the Law Committee.

Dr. Smith next introduced Dr. E. S. GAYLORD, New Haven, Conn., chairman of the National Relief Fund Committee, who made an appeal to the members of the society for contributions to the Relief Fund.

The next order of business was the reading of a paper by Dr. C. N. JOHNSON, Chicago, Ill., entitled "The Selection of Filling Materials for the Different Classes of Cavities."

[This paper is printed in full at page 1109 of the present issue of the COSMOS.]

Discussion.

Dr. A. L. SWIFT, New York, N. Y. When accepting the president's invitation to open the discussion of Dr. Johnson's paper, I remarked to him that, judging from my familiarity with the writing and teaching of Dr. Johnson, his paper would undoubtedly so thoroughly and comprehensively cover the subject that one who has been so nearly in accord with his former expressions on this subject as myself would find very little to discuss.

The reading of this admirable paper confirmed my conjecture, so if my discussion, which must necessarily be taken up under the classification of the author, seems to be largely a repetition and mainly an agreement with the essayist, I can but ask your indulgence, with the promise that it will at least be brief.

The essayist very aptly calls our attention to the tendency of many operators to get into ruts, and to follow tenaciously certain methods of procedure which appeal to them in all cases, unmindful of the fact that other methods in many instances might be of far greater service.

The statement of many gold inlay enthusiasts that they have relegated their gold pluggers to the ash-heap, the discussion of such subjects as "The Passing

of the Gold Foil Filling: A Prophecy," and the zealous advocacy of porcelain inlays by others, seem to confirm the statement of the essayist that we are apt to get into ruts.

If this be true—and we must acknowledge that it is—a careful selection of filling materials for the different classes of cavities as outlined in Dr. Johnson's paper seems to be most timely.

Agreeing with the essayist's statement that "No filling material has yet been found which will so perfectly protect a tooth against further decay as will pure gold foil where it can be made technically perfect," I still find use for my gold pluggers, and believe that in certain classes of cavities, gold foil will serve a much better purpose than inlays. Undoubtedly it is the custom to insert gold inlays in small cavities where gold foil could be used to much better advantage, as they would occupy on the whole much less time and avoid the useless cutting of sound tooth structure for the enlargement of cavities which is necessary to render the insertion of inlays practicable.

In the treatment of cavities in the approximal surfaces of incisors and canines, the question of esthetics confronts us, and if gold fillings would be too conspicuous, we must of necessity turn to either porcelain or the silicates. The essayist has pointed out the undesirability of porcelain inlays, due to the frailty of their margins and the staining of the lines between the inlay and the enamel, and has contrasted the greater wearing qualities of porcelain as compared with those of the silicates, giving the preference, so far as appearance is concerned, to the silicates, but condemning the lack of strength of the silicates as unreliable for contour work and in positions where the stress of mastication is to be reckoned with. Agreeing entirely with these deductions and acknowledging the handicap involved in dealing with these imperfect materials, it seems impossible to follow any general rule as to the choice of either.

Dr. Johnson suggests "following the general rule that, wherever these materials are called for, the smaller the cavity the greater the indication for silicate, and the larger the cavity the greater the indication for porcelain." The latter part of this rule, referring to the use of porcelain in large cavities, I agree with, but in small approximal cavities, notwithstanding the difficulty of obtaining perfect technical results, the porcelain inlay has proved more satisfactory than have the silicates in my experience.

The restoration of the incisal angle with a gold inlay, the labial surface of which has been prepared to receive a filling of silicate after the inlay has been set, certainly helps to solve this question in some cases. I have seen more lasting results, however, by porcelain baked into the labial surface of the inlay, although the silicate serves better as to appearance.

In cavities in the gingival third of labial surfaces of incisors and canines which are not exposed to view, gold foil or gold inlays are indicated, the choice of either depending upon the size of the cavity and the proximity of the gum margins. In those exposed to view, again, the question of the choice between porcelain and the silicates must be met, taking into consideration the better appearance of the silicates as against the better wearing qualities of porcelain.

The note of caution interjected by Dr. Johnson as to cavity preparation in this class of cavities, with special consideration of the necessity for good mechanical anchorage where inlays or silicates are to be used, is most opportune, as a large percentage of such failures are due to shallow cavities with insufficient anchorage.

Regarding the treatment of cavities involving the incisal ends of incisors and canines, I am thoroughly in accord with the essayist's conclusions.

In cavities involving the approximal and occlusal surfaces of bicuspids and molars, the cast gold inlay is indicated, except when the question of economy necessitates the use of amalgam. The gold inlay minimizes the strain on the patient, avoids the discomfort of the rubber dam, the separation of the teeth, the tedious malleting of gold foil and

finishing and polishing of the filling in the mouth, and is a godsend to the patient. The ability to preserve perfectly the interproximal spaces with not the slightest excuse for injury to the gingival attachments which so often is the result of finishing gold foil fillings, is a strong argument in favor of the gold inlay, assuming of course that the inlays are made technically perfect. Here, too, a note of warning should be sounded as to the perfect adaptation of the inlay at the gingival border and the necessity for perfect mechanical anchorage, dependence to be placed upon recognized mechanical laws for retention where so much force is to be exerted, and not upon the cement. Recurrent failures along these lines have caused many patients to decide that all gold inlays are to be avoided.

As to cavities in the occlusal surfaces of bicuspids and molars, gold foil is indicated in small pit and fissure cavities for the reasons enumerated, but in extensive occlusal cavities the gold inlay is most suitable; in fact, in these cavities especially, the ability to restore normal occlusion by appropriate carving of the wax core is most important, and possesses possibilities which should never be overlooked, if we would restore these organs to their full field of usefulness.

In cavities in the gingival third of the buccal or lingual surfaces of bicuspids and molars, I agree with the essayist that gold inlays or amalgam are clearly indicated in preference to the use of gold foil, especially when the cavities extend under the gum, the inlay to be given the preference over amalgam where it is feasible.

In small cavities in the lingual surfaces of incisors and in the occlusal third of the buccal surfaces of molars, gold foil is undoubtedly the best material; if they have become extensive through neglect, etc., the gold inlay would be my preference.

I wished to refer to the indications for the use of copper oxyphosphate in certain classes of cases, and other phases of this subject, but decided to confine my discussion entirely to the paper as presented.

In closing his paper, Dr. Johnson says, "The aim of the profession should be in the direction of preventing cavities instead of filling them"; but he adds his strong conviction that the millennium of preventive dentistry will not become an established fact for many years to come, and in the meantime he makes it incumbent upon the profession to live up to the highest ideal of service for the greatest welfare of humanity—a fitting climax to an admirable paper.

Dr. S. E. DAVENPORT, New York, N. Y. I trust that our president will allow me a personal word, even if it be out of order. I find myself feeling singularly at home in this body, considering that I made my last appearance at a meeting of this society thirty-six years ago. In May 1878 the degree of M.D.S. was conferred upon the late Dr. R. C. Brewster of Brooklyn, the late Dr. Charles (Quaker) Miller of New York, Dr. Isaac B. Davenport of Paris, and myself, the diplomas bearing the names of Leon F. Harvey, president of the society, S. A. Freeman, secretary, and Norman W. Kingsley, William Jarvie, Jr., S. D. French, C. F. Rich, Stewart B. Palmer, S. H. McCall, F. French, and A. P. Southwick, censors.

Is not that a document to be proud of? And what memories of accomplishment those names arouse!

Being a Massachusetts Yankee, I will hazard the supposition as a "guess" that after Dr. Johnson accepted the invitation to present a paper at this meeting, he gave some considerable time to earnest thought before he decided upon "The Filling Material for the Different Classes of Cavities."

I am glad to have heard this paper and to partake in its discussion. We are advised, all through the paper, to consider carefully the demands and peculiarities of the cavity we are at work upon and to choose a filling material in accordance therewith. That is true conservatism, of which we have had too little during these last years. The old conun-

drum—"One run, all run," with its answer, "Sheep"—may be said to apply to dentists, and we are very apt not only to run fast in a body, but to adopt new methods or materials so fully as to use them to the exclusion of better and well-proved materials.

Having recently heard a prominent New York City practitioner state that he used only gold inlays for the molars and bicuspids and silicates for the anterior teeth, and that he never used the rubber dam; having been told by another that he never used gold foil now that we have the inlay method; by another that he never used amalgam; having read several papers and even editorials advocating in effect the use of gold inlays to the entire exclusion of gold foil fillings, it is refreshing to hear a paper condemning ruts and hobbies and advocating thoughtful decision in the selection of filling materials, from a man of Dr. Johnson's standing, a teacher and an editor as well as an operator. It is a relief, indeed, to learn from so high a source that usually we really have a choice of materials, and that we are not, after all, to be limited to one plan, one method, and one material selected for us by some of the radicals of the present day. The paper to which we have just listened, like some of the recent writings of Dr. Clarence J. Grieves of Baltimore, William W. Atkinson of Philadelphia, Dr. J. Edmund Kells of New Orleans, Dr. H. B. Tileston of Louisville, and Dr. Herbert L. Wheeler of New York, encourages us to apply calm, logical judgment to our daily problems, and the right note has therefore in my opinion been struck by Dr. Johnson. To show how fully in accord I am with Dr. Johnson's position, I take the liberty of quoting the following from a paper entitled "The Choice of a Filling Material," which I read before a Massachusetts society:

> Perhaps this is the proper place to state that for many years I have contended that every cavity will, before it is fully excavated, tell us in no uncertain language what material it should be filled with. Sometimes, of course, we could use either of two materials with the same probability of preserving the tooth.
>
> Sometimes, because of a lack of familiarity with the particular mouth, we find our only positive testimony in the direction of what the cavity should *not* be filled with. In such cases we should select the best of the remaining materials, recognizing that our choice was experimental, and depending upon the result for future decisions in the same mouth.
>
> Careful records of all operations are of course necessary for the guidance of our best judgment, and system in all directions is an aid to progress in this, as in all other departments of our work.
>
> The health and age of the patient, the condition of fillings already in the mouth, the composition of the saliva and mucus, the structural strength of the particular tooth, and the proportion of mastication it will be called upon to perform—all these and other influencing points should be considered before we choose our filling material.

If I should be requested to state what, in my opinion, is the most dangerous element of present-day practice, I would reply, "The thoughtless and ruthless destruction of tooth structure."

We should guard against this more carefully, and one of the most important questions governing our choice of a filling material should be, "With what material can I fill this tooth, to stop its decay and make it useful, with the least destruction of tooth substance?" Large gold inlays are often inserted, after extensive cutting away of strong tooth substance to make the impression or inlay wax "draw," when a small gold foil or amalgam filling would preserve the tooth and conserve the tooth structure. I have heard it stated as an argument for extensive cutting away of tooth substance and the use of gold inlays that small gold or amalgam fillings will fail. Some of the best gold inlays I know of are those the leaking margins of which I have had the privilege of repairing with amalgam.

As I stated previously, we are too apt to use a material in a wholesale way, while it should be used only on occasions. I once heard one of the best dentists who ever belonged to this society state in a meeting of the New York Odontological Society that he believed copper

amalgam to possess all the attributes of an ideal filling material. He lived to regret his ready use of it.

Many of the best practitioners, thirty-five years ago advocated the extraction of the permanent first molars as a panacea for all ills of malocclusion, and lived—many of them—to regret it. I could call to your minds many other illustrations of too general use of methods possessing value in individual cases, but that is unnecessary, my point of argument being only that the extremely radical is shortlived. The thoughtful, carefully chosen conservative plan is the one to tie to. That is why I applaud Dr. Johnson and extend to him my felicitations.

Dr. C. F. Ash, New York. While I do not wish to appear as being appointed chief objector to any remarks Dr. Johnson might make, I must take exception to one or two points in his paper as I took exception this morning to what he said.

He made the statement that, in his opinion, the best filling material for the gingival third of the molar or bicuspid on the lingual or buccal surface is amalgam or a gold inlay, if such is possible. It is my opinion, backed by the opinions of some other practitioners, that the immunity to the recurrence of caries is greater around a porcelain inlay than around a gold inlay. Granting the difficulty which the average patient has in keeping thoroughly clean the buccal and lingual surfaces of the molars especially, you will readily agree that they can keep a properly constructed porcelain inlay cleaner than they could a gold inlay with the same amount of effort. If it is possible to insert an inlay of any sort at that point, I should give preference to a porcelain over a gold inlay.

In reference to the use of silicate cements, the essayist said that the average operator finds work on cavities which involve the cervical margins of incisors to be so painful that he is inclined to stop short of imparting to the cavity a mechanically retentive form.

A great many operators have reported failures of silicate cements, while some few have reported very satisfactory successes, and in talking with the latter I have found that the method which I advocated some years ago has been followed by them, that is, before inserting a silicate cement filling, no matter of what make, the cavity should be lined with oxyphosphate cement. If that is done, it is not necessary to secure as much mechanical retention as might otherwise be required. It is only necessary then to prepare the cavity in the same way as for an ordinary porcelain inlay.

Dr. J. V. Conzett, Dubuque, Iowa. I have no criticism to make upon Dr. Johnson's paper. I might emphasize, however, some points and depart from some of his methods or procedures in some cases, for Dr. Johnson has given us the ideal, and we cannot always follow the ideal.

I cannot too strongly emphasize that we should be careful not to follow the line of least resistance. Even though nature does so, though water, in order to find a level, when it comes to an obstruction goes around it, and electricity, instead of jumping over a small air-space, will travel over miles of wire, yet when a human being follows the line of least resistance, his character and will power become weaker.

I have frequently said to students that if the gold filling served no other purpose than that of obtaining the most perfect technique which it is possible for the operative dentist to obtain, it should never go out of existence; for I believe there is no better method of perfecting the operative dentist than by the making of gold fillings. I fully believe that the operators who have thrown away their gold pluggers will pick them up again. Every man who calls himself an operative dentist should perfect himself in the making of fillings of any kind, whether they be amalgam, gold foil, gold inlays, porcelain inlays, or cements. A man cannot lay claim to the title of operative dentist until he is the master of all materials and methods; then he can choose the best method for the operation under consideration. As Dr. Gethro has aptly said, there is no one best

method or set of materials for all cases, but for the case under treatment there is one best material to be used, and the material which is best for you to use in a given case may not be the best material for *me* to use and *vice versa.*. The patient's advantage should be considered above all else.

The gold filling is, as Dr. Johnson has said, the king of filling materials when properly used, but it is one of the most exacting, and the great number of failures have not been due to faulty material, but faulty manipulation. The strain incident to the use of gold foil is not tolerated by many patients, and we are driven away from the gold filling to the inlay or other substitutes.

I shall read a paper tomorrow on the relative values of the gold inlay and the gold foil filling, and therefore will not take up the question now.

In regard to amalgam fillings in the gingival third of molars and bicuspids, I believe that whenever possible, it is best for us to get away from the amalgam filling in that particular class of cavities, because the packing of amalgam requires pressure, and *maintained* pressure. If we insert amalgam in a long narrow cavity, as in the gingival surface of a molar or bicuspid, around which we cannot place a matrix to retain the material, and with the plugger point exert pressure on another portion of the filling, we disturb the portion already placed, and do not obtain sufficient adaptation to make an impervious filling. If we can place a matrix around a cavity in such a manner as to make it box-shaped, then we can insert amalgam and condense it, and obtain a perfect result.

Dr. Ash claimed that caries is more liable to occur around a gold inlay than around a porcelain inlay. I do not believe that this is true. I believe that a well-made gold inlay will protect the tooth better than a porcelain inlay by reason of the fact that we can protect the enamel rods with the gold inlay better than with the porcelain inlay. Cavities in the gingival third must have the enamel rods protected by reason of the histological structure of the rods. By virtue of a perfect knowledge of the arrangement of the rods, we may make a cavity so that there will be no short rods left; but it requires a perfect technique, and the reason why edges appear around porcelain inlays is not so much the dissolving of the cement, but the imperfect enamel margins; short enamel rods have been left at the surface of the inlay, and these break down, leaving a ditch. The recurrence of caries around porcelain, gold, or any filling is not so much due to leakage as to imperfect extension. Caries recurs less frequently at the margin than contiguously to the margins, in portions not properly extended, and from there it extends to the filling or inlay. A gold inlay with a properly beveled margin and a flange of gold which can be burnished to the tooth, thereby sealing the ends of the enamel rods and the cement, will give protection to the enamel margins which is second only to that of a well-made gold filling.

Dr. H. E. S. Chayes, New York. What is the reason that the apparent agreement running through the discussion of Dr. Johnson's paper in reality means a disagreement with Dr. Johnson's views? Is it because they agree so perfectly with what Dr. Johnson said, or is it because of the difference of their understanding of what Dr. Johnson said? I did not understand Dr. Johnson to say that the gold foil filling is more advantageous than the gold inlay because of the conservation of tooth structure, and particularly he did not say that this is the case when the gold inlay is indicated. Nor did I understand him to say that the silicate cement filling is more advantageous than the porcelain inlay when the latter is indicated. The essayist tried to give us what we so seriously need, viz, a standard for the use of various materials in their various places. But the very fact that the different men who heard Dr. Johnson's paper understood his paper differently proves that there is something wrong with our conception of dentistry and its requirements. We have no standardized conception of dentistry. How, then, can we have any conception of the requirements of that

of which we have no conception at all? I do not know how we are going to remedy this all at one fell swoop, but the men who have been called radicals are not to be condemned for the fact that they are radical—for if it were not for their radicalism, dentistry today would be in the same position that it was thirty years ago. It is not confirmed conservatism that makes progress in the profession; it is not the man who sticks to one method and practices it throughout his entire life who is responsible for the growth and the concrete ideas that seem to emanate from some of the men who today are called radicalists. It is the man who is willing to try the new thing carefully and conservatively, for the sake of his patients and for the growth of his profession, so that it may be consecrated to the service of humanity, for which it is meant. We must try innovations if we wish to grow. I emphasize this, although tonight that which in time should prove the greatest conserver of teeth, the gold inlay, has been subtly condemned. We shall come to realize that it is what some of us have intuitively realized it to be, the greatest saver of tooth structure, even though it involves temporary sacrifice of a little more structure for better and more perfect construction. The more a tooth needs restoration, the greater is the call for the gold inlay; and the greater the number of surfaces of a tooth calling for restoration, the greater and more insistent is the call for restoration by the cast gold inlay. The writings of Ottolengui, Young, Rhein, and your humble servant have been persistent and insistent enough to uphold that contention, and last but not least, Dr. Conzett, in his admirable articles which were published in the *Items of Interest,* I think made it plain that he who objects to the cast gold inlay is not a master of the technique. For the sake of our profession, let us master this work before we criticize; let us acquaint ourselves with the details of the work which carries with it the germ of possibility of saving more teeth than the dentist has ever been able to save by purely mechanical means—and that is all that we are considering tonight. We cannot assume, in justice to the cast gold inlay and to our patients, that the gold foil filling has advantages in large extensive cavities over the cast gold inlay. I agree that there are some cavities in which gold foil fillings are indicated, but they are growing fewer. Because of the persistence of the dentist in employing gold foil fillings indiscriminately, cavities are getting larger, and the need for gold foil is getting less, in spite of the effect of the great wave of prophylaxis that is sweeping over the land. An operator must acquaint himself with the possibilities of this new technique before he can condemn it. It is up to you to ask yourself the question whether you will perfect yourself in the technique of this new work, or whether you will wait until this wave of intuitive realization which is sweeping over the land has enlightened the public, and will make the public tell you what you should have told them.

Dr. Johnson (closing the discussion). I am greatly flattered by the reception of the paper, and awfully discouraged. If I could have had a little more opposition, I should have felt more comfortable. The few voices of opposition seem to have been silenced by Dr. Conzett. He has refuted Dr. Ash's indorsement of the porcelain in preference to the gold inlay in the cavities specified. I want to ask Dr. Ash what is there in a filling that saves carious teeth? It is the proper sealing of the cavity against leakage, the proper protection of the margins of the cavity. As Dr. Conzett said, these margins must be laid in certain areas in order to prevent recurrence of caries around the filling, and the gold inlay will preserve teeth against the recurrence of caries in those portions as perfectly as the porcelain inlay. In other words, there is no therapeutic action in porcelain which makes it more advantageous as a tooth-saver than gold, given the same degree of manipulative skill.

Dr. Chayes remarked that we must not too much condemn the radical. Unless some men have the courage and the en-

thusiasm to go a little ahead of the profession and try out new methods, we shall not make much advancement, and I am far from advocating that kind of conservatism which prevents men from testing the new. Nevertheless, we owe it to our profession that we shall not allow the enthusiasm of the moment to cause us to lose sight of our old friends, the true and tried. So many times men have advocated discarding the use of gold pluggers. The time has not yet come in dentistry when we can serve our patients to the best advantage and discard our gold pluggers. It may come some time, but only by reason of the introduction of something we have not had among our filling materials, because, as I said in my paper, there is nothing in the alchemy of nature with which we are familiar today that so perfectly protects the teeth from progressive caries as a perfectly adapted gold foil filling.

In closing, I wish to express my keen appreciation of the privilege you have extended to me to appear before your association. I want to apologize for not having come here before. The one reason for that is that usually our own state dental association meets in the same month as yours does; but this year we had our meeting a month or two earlier. You have done me the honor on many occasions of inviting me here; in fact, as I told some friends today, I have been invited so many times that I was ashamed to refuse any longer. I want to express my appreciation of the courtesy shown me, and on behalf of the Illinois Society I extend to any and all members of the New York State Society a cordial invitation to meet with us at any time, as we are glad to meet with you.

(To be continued.)

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PHILADELPHIA, OCTOBER 1914.

EDITORIAL DEPARTMENT.

THE LONDON MEETINGS.

THE impression has gained prevalence that owing to the outbreak of war in Europe the meetings of the Sixth International Congress and of the Fédération Dentaire Internationale in London during the first week in August were total failures, which is not by any means in accordance with the facts. It is true, nevertheless, that the attendance of representatives from the several countries of the continent of Europe was meager, while the silence which in so many instances punctuated the roll-call of delegates from continental countries was not only noticeable, but so grimly significant as to cast a pathetic gloom over the assemblage of delegates from more fortunate countries to the F. D. I.

But, just because the stress of the war situation had enforced the absence of many members of the Federation whose counsels and personalities had on previous occasions endeared them to all present, the value and importance of the meetings of this great

international advisory body were given added emphasis. Indeed, the Vice-chancellor of the University of London in his address of welcome called attention to the outstanding fact that the principal and most important function of an organization like the F. D. I. was to obliterate the provincialism and political differences of nations, in so far as these were influences affecting scientific and professional men, by the civilizing and humanizing effect of social and intellectual contact among the representative men of science of all nationalities; and the extent to which the F. D. I. had been a factor in thus fraternalizing its cosmopolitan membership was evidenced by the sorrow which was felt by all present because of the conditions which had necessitated the absence of so many whose sympathies were wholly with the work and ideals of the F. D. I.

Probably no other circumstances than those imposed by this great European conflict could have so pointedly brought out the realization of the strong ties of friendship which in an international sense have developed among the various delegates during the fourteen years of activity of the International Dental Federation, and in so far as pointed emphasis was given to the spirit of professional confraternity in its international aspect the London meeting of the F. D. I. was more successful than any of its predecessors.

In an equal degree the same factor was everywhere manifest in the meetings, both professional and social, of the Sixth International Dental Congress. While the representation from Europe outside of Great Britain was unusually small, the representation from the United States and from the British self-governing colonies was unusually large. The attractions of London as a place of meeting and the fact that the proceedings were carried on in English doubtless served as added inducements to attract a large number of American practitioners to the congress—for it is gratifying to note that, whatever the cause may have been, the attendance of Americans was larger than it has heretofore been at any of the dental congresses held in Europe.

The congress itself was greatly disturbed by the general uncertainty as to whether it should or should not be abandoned on account of the war situation; but when announcement was officially made of the determination to continue it, the proceedings

were carried out consistently with the program practically up to the close, with the exception of the omission of essays and clinics by those who were unavoidably absent.

The social features of the congress were characteristic of the hospitality of our English *confrères*, and served to bring into friendly contact old acquaintances and to impress new ones with the depth and generosity of those who as hosts gave them British welcome and cheer.

The organization naturally felt keenly disappointed at the partial disintegration of their plans for the congress, but notwithstanding the general appreciation of the members of all that had been accomplished it was decided at the closing meeting, upon motion of the Hon. Secretary-general, to adjourn to meet again in London as the Sixth International Dental Congress at a date to be determined upon by the F. D. I. subsequent to the proclamation of a general treaty of peace in Europe. This decision was taken upon the expression of a desire by the congress organization to be given opportunity to more fully carry out their plans for the intellectual and hospitable entertainment of the members.

No!—all things considered, the London meetings were anything but failures, and the good which they accomplished is far greater than will be evidenced by the published proceedings.

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, July 11, 1914.]

THE PRINCIPLE OF LIQUID ROOT-CANAL FILLINGS, WITH SPECIAL CONSIDERATION OF ALBRECHT'S FILLING MATERIAL. BY ZAHNARZT R. MOELLER, HAMBURG.

The treatment of root-canals is surely one of the most important problems of dentistry, and of the several steps leading up to final results the obturation of the canal is of the greatest significance. This portion of the operation, viz, the filling of root-canals, has produced a great deal of discussion in dental literature, the greater part of which has been based on empiricism, while truly scientific experiments in regard to the methods and materials are only now beginning to come to the fore. The factors necessary for the successful filling of a root-canal are perfect access as far as the apical foramen, complete removal of organic matter from the root-canal and its ramifications, and perfect sterility, with perfect dryness.

The root-filling material must fulfil the following requirements: (1) It must reach portions of the root-canal which cannot be reached by instruments; (2) it must impregnate and render innocuous any organic material that may have been left in the canal or its branches; (3) it must sterilize and keep sterile any parts of the canal which have perhaps not been completely sterilized; (4) it must desiccate any portions of the canal that have not been perfectly dried, or form an innocuous solid combination with any liquid left.

Close examination of the conditions involved and scientific investigation have shown that only liquid filling materials can fulfil the conditions enumerated. Dr. Albrecht has suggested a combination of three separate liquids—formalin, resorcin-thymol-glycerin and caustic soda solution—which, if mixed in the proportions of 2:2:1, assume within from three to four hours a firm gelatinous consistence of reddish yellow or transparent wine-red hue. This material has one disadvantage, however, viz, it contracts considerably. This drawback is overcome by the introduction of paraffin-thymol points melted into the canal.

The writer concludes that only such liquid root-canal filling materials are of any value as will help the operator to overcome the imperfections of our technique of treatment of root-canals due to unalterable natural conditions.

[*Monthly Cyclopedia and Medical Bulletin*, Philadelphia, August 1914, and *British Medical Journal*, London, June 27, 1914.]

INTERNAL SECRETIONS AND DENTAL CARIES, WITH SPECIAL REFERENCE TO THYROID INEFFICIENCY. BY H. P. PICKERILL.

Pickerill calls attention to the fact that the thyroid, pituitary, and thymus glands may, by their secretions, be capable of influencing the resistance of the teeth to caries, it being possible that each of these glands pours into the circulation substances which affect calcium metabolism and utilization and "which might be called 'osteogenetic' or 'dentogenetic' hormones." It is a deficiency in the case of each of these secretions which might lead to an increased susceptibility to caries. There is clinical evidence which inclines the writer to think that there is a relation between dental caries in children and the condition of thyroid inefficiency. So far, this cannot be proved, for the other possible factors clinically encountered in cases of caries are so frequently present as to obscure the exact bearing of the secretion of the thyroid. Pickerill succeeded in securing one thyroidectomized rabbit which survived the

operation for a long enough time to permit of observations. This animal showed a loss of calcium in the fauces considerably in excess of that occurring in controls, along with a considerably more complete carbohydrate digestion. The teeth of this animal were well formed and normal, except that they were very white and lacked the "fine black deposit which is almost universally present on rodents' and other animals' teeth (and also in many cases of human teeth immune to caries)." The specific gravity of this animal's teeth was slightly below that of controls, and the teeth yielded slightly less ash than normal. The calcium present in these teeth fell two and one-tenth per cent. below the normal of controls. The saliva of the thyroidectomized animal showed slightly reduced alkalinity and contained less calcium than normal. No experiments have been performed to test the influence of the pituitary or thymus, but it would seem that, if the latter does play a part, it could involve the deciduous teeth only. Pickerill warns against any generalization from either the clinical observations and suggestions or from the experimental findings reported.

[*La Stomatologia*, Milan, June 22, 1914.]

THE ANTISEPTIC ACTION OF THE BIFLUORIDS, AND THEIR APPLICATION IN DENTAL THERAPEUTICS. By Dr. G. Fasoli.

In his investigation as to the merits of the bifluorids, which have in late years been frequently applied in dental therapeutics, especially in the treatment of pyorrhea alveolaris, Fasoli has reached the following conclusions:

The bifluorids of ammonium and sodium may be applied in the treatment of pyorrhea alveolaris, chiefly because of their mollifying action upon tartar. Still, neither hydrofluoric acid nor its salts really dissolve tartar. Hydrofluoric acid, even in 10 per cent. solution, should not be employed, as it is dangerous to the tissues, and attacks the hard tissues of the teeth despite assertions to the contrary. Sodium bifluorid, though less soluble, should take the place of ammonium fluorid on account of its stability and the greater tolerance of the tissues toward this drug. Sodium bifluorid in concentrated solution deserves serious consideration, though it cannot be counted among the very strong bactericides. It is especially marked in its action upon the staphylococcus pyogenes aureus and considerably retards the development of the spores of the anthrax bacillus. Ammonium bifluorid, on the other hand, possesses no notable antiseptic power.

[*La Province Dentaire*, Paris, October 15, 1914.]

EASY METHOD OF TAKING IMPRESSIONS FOR SURGICAL PROSTHESIS. By Dr. A. Pont.

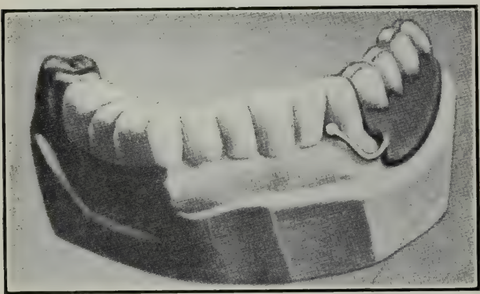
In cases of considerable loss of tissue, the taking of an all-plaster or all-modeling-compound impression is usually connected with insurmountable difficulties. In cleft palate, hare-lip, resection of the maxilla, etc., a composite impression is preferable. Such impressions are obtained by inserting a small piece of softened modeling compound in the nasal cavity, pressing it into place with the fingers, and spreading it out so as to cover the upper part of the nasal cavity, which, together with the pharynx, has been previously anesthetized with a solution of cocain. After hardening, the first piece is removed and washed, and its under surface is scored so that the next piece may be made to fit on it. It is then replaced, and the second piece of modeling compound is worked into it. If necessary, a third section is used. In this way the nasal fossæ are molded to their full extent, and the compound reaches to the edge of the fissure without distorting it, and it then only remains to take an impression of the mouth in the usual way.

In order to obviate any displacement of the blocks of modeling compound, each section is perforated through its center so as to coincide with the perforation in the other blocks, and a silk thread is drawn through these holes with a sound, which is then passed from the mouth through the nasal cavity and out by the nares. A small piece of cotton is tied to the end of the string in the mouth so as to prevent the silk thread from being drawn through the perforations in the modeling compound blocks. The patient or an assistant holds that end of the thread which extends from the nares, and prevents the composition blocks from being displaced while the impression of the mouth is taken in plaster.

[*Zahnaerztliche Orthopaedie und Prothese*, Munich, June 1914.]

BALL CLASPS FOR PARTIAL DENTURES. By S. Henrichsen.

Clasps, no matter how carefully applied, are more or less destructive to the teeth which they embrace. To overcome this drawback, it has been the habit of many practitioners either to crown or to protect with an inlay the tooth to be clasped. Many clasps have been designed with the intention of preventing abrasion of the teeth and the lodgment of food débris between the clasp and the tooth so fatal for the life of the latter. Generally the surface of the clasp in contact



with the tooth is too broad, or else it is so small as to cut into the tooth. The writer describes a new form of clasp which has been suggested to him by a French laboratory man, and which he calls ball clasp. This clasp is a loop of perfectly round wire, the end of which is melted into ball shape. This ball comes to lie between two teeth directly over the interdental papilla without touching it. The hold of the clasp is attained by the spring effect afforded by the wire loop. Since this loop passes below the cervical margin of the tooth nearest to the plate, it is invisible. No lodgment is given to food débris, and the clasp can be applied in the maxilla as well as in the mandible.

[*Archiv für Laryngologie und Rhinologie*, Berlin, No. 3, 1914.]

DISCOVERY OF AN AMŒBA IN A MAXILLARY CYST. By Dr. V. Guttmann.

In the case of a maxillary cyst, the writer found the cyst cavity partly occupied by amœbæ, partly by amœboid formations, which were closely examined with a view to establishing, if possible, a pathogenic connection between the cyst and the amœbæ. These amœbæ were present not only in the cyst cavity, but also within and below the cyst epithelium, even deeply embedded in the connective tissue of the cyst wall. The location of the cyst permitted of the supposition that endamœbæ buccales had invaded it from the mouth and had multiplied. The form of these amœbæ resembled that of the so-called limax amœba. Only in a few specimens was it possible to distinguish between ectoplasm and endoplasm. Numerous vacuoles, some containing a substance of undetermined nature, were observed in some of these parasites. Although the cyst contained numerous bacteria, none of them could be found in the vacuoles of the amœbæ, the protoplasmic structure of which was far from uniform. Some exhibited typical reticular structure with smaller or larger meshes, others showed a filiform felt structure of more or less dense character; sometimes the threads were branched and arranged in strands. These filiform structures appeared chiefly to be plasma strands or plasma spindles. The threads themselves were either smooth and without structure or they contained very small circular chromioles, which gave them the appearance of chondromites, or of elongated chromatin particles.

As to the process of reproduction of these parasites, Guttmann was able to demonstrate certain sexual functions, yet no actual copulation. The cysts, which were found in great numbers in the sections, were small, measuring 22 microns on an average, roundish and sometimes exhibited a clearly defined double membrane. The life cycle of this amœba is described by the writer as follows: Reproduction occurs by simple or multiple division. During the transition from vegetative to sexual function, a considerable increase in the amount of chromatin in the cytoplasm is noticeable; then follows encystment, in the beginning of which process, as well as in young cysts, many chromidia are present. In the cysts the nuclei increase in number, and after the chromidia have disappeared, break up into small mononuclear amœbæ, which act as isogametes, probably two joining and copulating their nuclei under phenomena of reduction.

The characteristics which distinguish this amœba from the typical endamœba buccalis are as follows: (1) Generally, ectoplasm

and endoplasm cannot be distinguished. (2) It is twice as large—it is possible, of course, that it may be confused with degenerating epithelial cells which may resemble large specimens of amœbæ. (3) Its nucleus contains a considerable amount of chromatin, and it has a thin nuclear membrane, exhibiting in these respects the reverse of the conditions found in endamœba buccalis. (4) It exhibits very few nutritive vacuoles, which never contain unmistakable bacteria or leucocytes. In this respect the abnormal conditions of life of the amœba in this case must be considered, though, on the other hand, the cysts contained a large number of bacteria. (5) The nuclear division and manner of reproduction of this amœba differ from those observed so far in endamœba buccalis. In the slides intended to show the gametogeny, however, misinterpretations may have occurred, owing to confusion with degenerated epithelial cells, and to the fixation of the cyst by formol, which is unsuitable for amœbæ.

[*British Dental Journal*, London, June 15, 1914.]

THE IMPURITIES IN COMMERCIAL NITROUS OXID FOR DENTAL USE, AND THEIR INJURIOUS EFFECTS BY INHALATION. BY W. B. HART AND F. W. MINSHALL.

In their carefully tabulated analyses, the writers have found that, considering the short interval of time that nitrous oxid is inhaled in dental anesthesia, and the large dilution of the gas by air or oxygen for analgesia, the minute amounts of gaseous impurities found in the samples examined by them are in general too small to have any effect on the patient, and it would appear that nitric oxid is the impurity that calls for special attention. Since this impurity is generally removed by passage of the gas through cold ferrous sulfate solution, with no formation of a definite stable compound, and from which solution the nitric oxid is easily liberated by rise of temperature, reduction of pressure, or by dilution, any insufficiency of absorbent and the rate of gas passage through it are of greater importance, in view of Lehmann's recent investigations published in *Archiv fuer Hygiene* for 1913.

The purity of the gas can be maintained and the purification operation simplified by the use of raw materials of the best quality; in earlier years it was recognized that only the purest ammonium nitrate should be used; then followed, mainly for economic purposes, the use of ammonium sulfate and sodium nitrate, and in view of the varying quality of these materials on the commercial market, it is imperative that the question of their purity should be taken into consideration. As regards the percentage of nitrous oxid in the commercial product, Baskerville and Stevenson (see *Journ. Ind. and Eng. Chem.*, 1911) recommend a minimum of 95. There appear to be no difficulties in the production of a gas of 98 per cent., as the authors show in a table of American analyses.

After careful consideration, both from the dental and the manufacturing points of view, and based upon the analytical results obtained on, and the difference found between the samples of 1913 and 1914, the writers propose the following recommendations as to the quality of commercial nitrous oxid for anesthetic and analgesic purposes:

Nitrous oxid, 98 per cent. minimum; moisture, not to exceed 0.0002 gram per 100 cc.; carbon dioxid, not to exceed 0.05 per cent. by volume; nitric oxid, not to exceed 0.001 per cent. by volume; ammonia, not to exceed 0.001 per cent. by volume; hydrochloric acid, chlorin and its oxids, iodin, sulfur, dioxid, sulfuric anhydrid, hydrogen sulfid, carbon monoxid, nitrogen tri-, tetr-, and pentoxids, cyanogen, hydrocyanic acid, hydrogen phosphid, arsenid and antimonid, ozone, dust, and all other impurities to be absent in an examination of 20 liters of the gas.

PERISCOPE.

Making Sterile Salt Solution from Hydrant Water.—K. Taege adds hydrochloric acid to ordinary hydrant water, and thus sterilizes it absolutely. Then he adds sodium hydroxid in the proper proportion to produce sodium chlorid in the desired percentage.—*Münchener Med. Wochenschrift*, per *Journ. of Amer. Med. Association.*

Condensation of Amalgam.—For the thorough initial condensation of amalgam, Dr. Bonwill's suggestion of a pledget of cotton or bibulous paper seems to fill the bill thoroughly. Properly used, it blocks the orifice of the cavity and carries the plastic amalgam under pressure into all the nooks and corners of the cavity so that it forms a foundation upon which more amalgam is readily packed.—W. H. TRUEMAN, *Dental Brief.*

Electrolytic Bath Used in Lead Poisoning.—An interesting case was related to the Royal Institute of Public Health in London recently, in which a workman suffering from lead poisoning was placed in an electrolytic bath for treatment. After three or four baths the morbid symptoms disappeared, while lead was found in the water and on the electrode. If the method is found successful in general application, lead poisoning will lose its terrors.—*Popular Mechanics.*

Removing the Odor of Iodoform.—The odor of iodoform may be removed from the hands by the application of mustard. The hands are moistened with cold water, a small quantity of dry mustard is placed in the palm, rubbed well over the hand, and washed off with soap and water. The odor can be removed from utensils in the same way, with the exception that the mustard paste should be allowed to remain on for several hours.—*The Hospital*, per *Monthly Cyclopedia and Med. Bulletin.*

Fetor of the Breath as a Symptom of Disease Other Than Dental Caries.—Foulness of the breath is met with in five groups of pathologic conditions, as follows: Septic and putrefactive changes within the nose and mouth; septic and putrefactive changes within the lungs; ingestion of certain substances, such as tobacco smoke, garlic, onions, spirits, whose products are excreted by the lungs and saliva; septic and putrefactive changes in the stomach and intestines; severe toxic conditions.—J. H. JOHNSON, *Western Dental Journal.*

Oral Sepsis in Pulmonary Tuberculosis.—R. C. Wingfield has had proper dental care given to twenty patients with chronic pulmonary tuberculosis, all of whom showed pyorrhea alveolaris, and half of these showed decided improvement in their general condition, only three failing to gain weight. Of the remaining ten, all had pyorrhea alveolaris except two who had septic roots, but of these none showed any improvement. Twenty-one questionable cases of chronic pulmonary tuberculosis were similarly cared for, fifteen of which were improved by the dental treatment, six remaining unimproved.—*Lancet*, per *N. Y. Med. Journal.*

Removal by Elevator of Isolated Upper Third Molar.—In this instance the root has naturally moved forward and requires special treatment. The straight elevator may be forced well under the anterior portion of the root, and the first molar or second bicuspid used partly as a fulcrum; the pressure should be downward rather than backward, but in this case there is very little danger of interfering with the tuberosity. When the bicuspids are gone and no natural fulcrum remains, the second finger of the left hand should be placed under the elevator to act as a rest for the blade, to steady it and thus to prevent a slip or a too sudden jerk while depressing the point in the act of removing or even loosening the root. The operation can be finished with fingers or forceps.—T. QUINLAN, *Ash's Monthly.*

Judicious Use of the Toothpick.—Much has been said for and against toothpicks, but if food has jammed between the teeth the quickest means of getting it out should be adopted, whether it be with silk floss or toothpicks, using care not to injure the gums. The pernicious habit, though, of systematically jamming a toothpick into the interproximal space, crowding the gum tissue down and then giving the pick a twist, thereby

lacerating and cutting the gums, should always be watched for and stopped, for the little pockets formed by the recession of the gums from this cause are places where débris lodges, and form an ideal place for growing pathogenic bacteria, thus infecting the gums and producing inflammation, which causes serumal deposit to gather, and pyorrhea to set in.—F. H. SKINNER, *Texas Dental Journal.*

Ascertaining Correct Occlusion in Plate Work.—More failures in plate work are due to faulty occlusion than to any other cause. There may be perfect fit, good adhesion, esthetic appearance, but when the jaws close there is trouble. Too much pains cannot be taken when adjusting the teeth in the mouth to see that the occlusion is correct.

The anterior teeth must *never* come in contact, for two reasons: It causes displacement of the upper denture, sooner or later, and the pressure upon the anterior margin of the gums causes absorption of bone, leaving the flexible ridge so often seen.

The best way to secure correct occlusion of the posterior teeth is the use of thick articulating paper, a strip being placed between the jaws upon each side, and the patient being told to bite rapidly and hard, for then he will bite correctly, and it will at once be seen where the closure is too hard, by the very black spot.—L. P. HASKELL, *Dental Summary.*

Selection of Posts in Crown Work.—Nearly every failure in post crowns is due to dowel pins too small both in diameter and length, usually the former. Many operators seem to think if they can get the pin to the apex of the tooth, the diameter is immaterial. Consequently we find many posts resembling hatpins in proportions.

The requirements of a good post are rigidity sufficient to withstand all strain and squareness of shape. Pure platinum should never be used; iridio-platinum answers all purposes.

Logan crowns demonstrate the failure of pure platinum by the many open joints we encounter in everyday practice.

If the pin is not ductile under the force of mastication, and has sufficient roughness to keep it from being pulled out of the cement either in the root or porcelain, and is *rigid* enough so it cannot be bent, there can be *no possible opening of the joint.* This I want to emphasize as the *most important factor* in crown construction.—S. M. WEAVER, *Dental Summary.*

Inserting Cement Fillings.—A pledget of cotton, tightly rolled, is very efficient in forcing into a cavity a mass of plastic cement, quickly and thoroughly, especialy silicate cement which shows a disposition to adhere to the instrument rather than to the cavity walls. When the cotton is removed, apparently most of the cement comes out with it. There is left, however, a coating of cement more evenly pressed to the cavity walls than can generally be done with instruments, and with this first coating added cement readily unites. There is a little knack in using the pledget of cotton or paper; it is not sufficient merely to hold it in the tweezers or plugging pliers; after the cotton has been placed in position, a plugger or burnisher is applied with considerable pressure directed against the walls of the cavity. This suggestion is one of the many which Dr. Bonwill gave so freely to the profession and which has been forgotten too soon and by too many.—W. H. TRUEMAN, *Dental Brief.*

Pulp Devitalization in Pyorrhea Alveolaris.—After the dentist has become convinced that the pulp of a pyorrheal tooth should be removed, it is usually difficult to obtain the consent of the patient to that operation, and particularly so if the anterior teeth are involved. The objections raised are that the teeth will not last as long with the pulp removed; that the operation will be painful; that the teeth will discolor. The first objection is one that can only be determined by clinical observation. The dental profession is divided as to the greater liability of a pulpless tooth to be attacked by caries, also as to the rapidity of the carious process over what it would be if the pulp were vital. The weight of opinion of those who have made a careful study of pyorrheal teeth seems to be that badly affected teeth, when treated, will hold their attachment longer and give less trouble if the pulps are removed. The second and third objections can be overcome if the teeth are properly manipulated. The pulps can be thoroughly and painlessly removed from the upper six anterior teeth and second bicuspids in nearly all cases under pressure anesthesia, or after the injection of a local anesthetic in the gum tissue and pericementum. The exceptions to this rule are usually the small, long-rooted lateral incisors, having a large exposure of root surface, in which cases the root-canals are often obliterated or so fine as to be very difficult to be followed with instruments. In such cases it is best to use arsenic.—W. O. TALBOT, *Dental Brief.*

Hints, Queries, and Comments.

SUGGESTIONS FOR MIXING AND PACKING DENTAL AMALGAM.

Having always practiced in the country, I have found dental amalgam to be one of my most useful means for the preservation of teeth, and in a period of forty-four years I have practically tested almost every amalgam offered in the market, a list of which might be, if of no other, of historical interest. The amalgams used by me in filling operations are as follows: Moffitt, Lawrence, Fletcher, Weston, Sterling, Walker, "Extra" Amalgam, Standard, Arlington, Caulk's Incisor Alloy, Dawson's White Alloy, Keller Medical Co.'s Non-Secret Alloy, Chicago Alloy, Keller Medical Co.'s Standard, Travers and Co.'s Platina Alloy, Flagg's Submarine, Keller Medical Co.'s Crown Gold Alloy, Flagg's Contour Alloy, Caulk's Par Excellence Alloy, Weagant's Copper Amalgam, Ames' Copper Alloy, Bonwill's Plastic Gold Alloy, Oliver Alloy, made by R. S. Williams; Register's Copper Amalgam, Crown Gold Alloy, Vose's Crown Alloy, S. S. White Globe Alloy, Johnson & Lund's White Alloy, Caulk's White Alloy, Century Alloy, Bennett's Dental Alloy, W. W. Atkinson's Science Alloy, Hard Crown Alloy, Fellowship Alloy, High Standard Alloy, Caulk's Twentieth Century Alloy, Rutherford's White Alloy, S. S. White Dentalloy.

Surely a formidable list, and one which might well cause the young practitioner to ponder how to select the best!

In the hope of improving my filling operations, I have been experimenting with the alloys enumerated, and I have kept a faithful record of the maker's name of the amalgam in every filling inserted. In this practice I have persisted for nearly fifty years, keeping accurate records of cements also, and it has aided me considerably in forming a personal opinion in regard to the value of these materials. For about fifteen years I have confined myself to the almost exclusive use of one make of alloy, which I believe to be the best practice, as, by doing so, the operator becomes thoroughly familiar with the behavior peculiar to his favorite alloy.

About the early seventies, Mr. Thomas Fletcher of England introduced dental ma-

Fig. 1.

Fig. 2.

Fig. 1: Fletcher's cylinder mold for amalgams.

Fig. 2: Cylinder mold for amalgam and cylinders of amalgam ready to be inserted. (Osgood.)

terials of his manufacture in this country, and, I believe, the Buffalo Dental Mfg. Co. acquired the right of their exclusive sale. Fletcher was a genius, and introduced some new methods of preparing amalgam. He used a rather clumsy scale for weighing the mercury and the alloy, and before introducing the amalgam into the cavity he molded it

into a cylinder, with the aid of the appliance illustrated in Fig. 1. I used this appliance for a long time, but found it to be too small for satisfactory work.

Thirteen years ago I purchased a little scale made by the S. S. White Dental Mfg. Co., for weighing the mercury and the alloy in correct proportions. I also had a mold made of steel (see Fig. 2), which has proved far more satisfactory than the Fletcher appliance, and it has been my invariable practice to weigh and to mold the material before use in a cavity.

For a cavity of moderate size, four grains of mercury are weighed out, to which six grains of alloy are added. The materials are then mixed in a glass mortar. Like Dr. R. H. Riethmüller (see "Amalgam Fillings," DENTAL COSMOS, March 1912, p. 385), I seriously object to the habit of some practitioners of mixing amalgam in the palm of the hand. for the reasons stated in the article quoted. After the amalgam is mixed in the mortar as well as possible, it is collected with an Ivory scraper of 4¼ inches total length, as used for vulcanite work, and transferred into the steel mold illustrated in Fig. 2. This steel mold is set on a thick glass slab, and the amalgam is then compressed, by means of the steel compressor, with all the force which can be exerted by hand pressure. The amalgam cylinder obtained by this process (see Fig. 2) is immediately transferred to a glass slab on the bracket table, broken up into small pieces of such size as appear convenient to the operator, and these are at once introduced into the cavity and condensed with flat-faced pluggers of suitable size.

If this method is employed, there is never any surplus of mercury at any stage of the operation; emphatically, there is no need of such a surplus!

The mixture that can be made in a mortar is indeed very unsatisfactory despite prolonged trituration, but under the influence of the heavy pressure to which the mixture is exposed in the steel mold, the mercury is diffused throughout the mass, so that, when the cylinder is broken up into small pieces, the surface of the fracture appears to be that of a fine metal, and, even though the amalgam be introduced into the cavity with all the operator's available manual pressure, no mercury can ever be noted on the surface of the condensed amalgam.

While it would be preposterous to claim that all my amalgam fillings are a success, I can truthfully assert that they all remain bright, and never is there to be seen that dark furrow around the edges so often observed in amalgam fillings. Many of my patients have been under my care for from twenty to forty years, which affords me an excellent opportunity to examine and judge my previous work, frequently referring to my records.

A practical test of the suggestions offered may induce other practitioners to bestow greater care upon their amalgam fillings, which will then surely prove a most efficient means for tooth conservation.

A. OSGOOD.

Bath, N. Y.

OBITUARY.

DR. M. WHILLDEN FOSTER.

[SEE FRONTISPIECE.]

DIED, at his home, 9 W. Franklin st., Baltimore, Md., June 30, 1914, M. WHILLDEN FOSTER, M.D., D.D.S., in his seventy-eighth year.

Dr. Foster sustained an injury to the brain caused by a fall last October which ended fatally on the date above stated. He had been able to get around until March of the present year, when he was forced to take to his bed, and on June 8th he resigned as dean of the Baltimore College of Dental Surgery after completing more than twenty years of service as its official head.

Dr. Foster was born in Philadelphia on May 17, 1837. His early education was obtained at Crowell's Academy for Boys at

West Chester, Pa. About 1854 he began the study of dentistry in that city as a private pupil of Dr. Jesse C. Green. He then went to Philadelphia, where he attended the Philadelphia Dental College for one session, at the close of which he went to Indianapolis, Ind., where he practiced his profession for one year. He then accepted the offer of a partnership with Dr. Swazey of Easton, Pa. At the end of a year's time the partnership was dissolved and Dr. Foster then removed to Wilmington, Del. About 1861 he became associated with Dr. Robert Arthur of Baltimore, continuing in the partnership thus formed for about five years, when he entered upon independent practice at 9 W. Franklin st., where he practiced continuously for more than forty years.

When the Maryland Dental College of Baltimore was created in 1873 Dr. Foster was elected to the professorship of dental mechanism and metallurgy, which position he continued to fill until the Maryland Dental College in 1879 was merged with the Baltimore College of Dental Surgery, at which time the latter institution conferred upon Dr. Foster the honorary degree of D.D.S., and at the same time he was elected to the chair of pathology and therapeutics in the Baltimore College of Dental Surgery, which position he held at the time of his death.

In 1894, upon the death of Dr. R. B. Winder, then dean of the Baltimore College of Dental Surgery, Dr. Foster was elected as his successor to that office. In addition to his qualification as a dental practitioner, Dr. Foster was graduated from the medical department of Washington University and also from the College of Physicians and Surgeons of Baltimore.

Dr. Foster married Miss Anna E. Green of West Chester in 1856. He is survived by his widow and one son, Dr. Wm. G. Foster, and one daughter, Isabel Foster. His remains were interred at Loudon Park Cemetery on July 2d. The pallbearers were selected from the faculty of the Baltimore College of Dental Surgery and "The Old Guard Club," of which Dr. Foster was one of the organizers.

The capacity of Dr. Foster for leadership is abundantly evidenced by the positions in connection with his profession which he was called upon to fill. As an educator and administrator of educational affairs his uninterrupted period of twenty years' service as dean of the Baltimore College of Dental Surgery is a striking example. He was possessed of a strong and characteristic personality, which eminently fitted him to be a director of the professional development of the students committed to his charge. He was always the wise and judicious counselor, the kind and sympathetic friend. The high estimate in which his judgment in educational matters was held is evidenced by the fact that when in 1884 a call was issued for the purpose of forming an association which should have for its object the improvement of dental educational methods in America, Dr. Foster, together with his colleague Dr. Winder, represented the Baltimore College of Dental Surgery at a meeting of dental college teachers in New York in August of that year, which organized at that time the National Association of Dental Faculties.

Dr. Foster was twice elected president of the National Dental Association, and was appointed a delegate to represent the National Dental Association at the International Dental Congress in Paris and the International Dental Federation at its meeting in Stockholm. He was a member and one time president of the Maryland State Dental Association, and an honorary member of the New Jersey State Dental Society.

The service which Dr. Foster always freely gave to his profession was characterized by that judicial quality of mind which makes for fairness and for the sympathetic consideration of the interests of all concerned, for he was both by birth and instinct in every sense of the word a gentleman. Kindliness and considerateness were his automatic reactions to the appeal which the interests of others made to him. Courteous in all of his life relationships, his fine sense of honor and his sterling quality of heart and mind made him universally beloved. He was fully representative of that apparently vanishing breed of men whom we approvingly and sympathetically speak of as gentlemen of the old school, whom neither the march of events nor the frictions and competitions imposed by our modern social conditions were able to rob of their gentlemanly birthright. Dentistry has lost one of its best representatives in the death of Dr. Foster, and all who knew him personally have lost not only a friend, but the materialization of an ideal that is rapidly becoming a thing of the past.

Society Notes and Announcements.

STATE UNIVERSITY OF IOWA ALUMNI ASSOCIATION.

THE next meeting of the Alumni Association of the Dental College of the State University of Iowa will be held at Iowa City, during the home-coming week, on Thursday, October 22, Friday, October 23, and Saturday morning, October 24, 1914. The Iowa-Minnesota football game will be played on Saturday afternoon, October 24th.

The entire meeting will be devoted to prosthodontia. The officers take pleasure in announcing that they have secured the services of Dr. G. H. Wilson of Cleveland, Ohio, author of the most modern and thorough work on dental prosthetics, and Dr. Forrest H. Orton of St. Paul, Minn., professor of crown and bridge work at the Dental College of the State University of Minnesota.

Dr. George H. Wilson will lecture and demonstrate on anatomical occlusion, its underlying principles, elucidating and comparing modern methods; also the retention of artificial dentures, discussing the different principles and demonstrating the different methods. Dr. F. H. Orton will give a lecture and clinic on crown and bridge work.

Other prominent prosthodontists will also contribute to this meeting.

RICHARD SUMMA, *President*,
JOHN VOSS, *Sec'y*.

NORTHEASTERN DENTAL ASSOCIATION.

THE twentieth annual meeting of the Northeastern Dental Association will be held in the Hotel Somerset, Boston, Mass., October 15, 16, and 17, 1914. The officers and committees are doing their best to have a rousing good meeting. Please remember the dates and attend.

EDGAR O. KINSMAN, *President*,
CHAS. F. KREPPEL, *Sec'y*,
Forest Hills, Mass.

INTERNATIONAL DENTAL FEDERATION.

AT the annual meeting of the International Dental Federation, London, England, August 6, 1914, the following officers were elected:

Hon. President—W. B. Paterson, London.

President—Truman W. Brophy, Chicago.

Vice-presidents—Harvey J. Burkhart, Batavia, N. Y.; F. Schaeffer-Stuckert, Frankfort-on-Main; M. Roy, Paris; W. Guy, Edinburgh; Rudolph Weiser, Vienna; Vincenzo Guerini, Naples; J. Howard Mummery, London; N. Etchepareborda, Buenos Aires; Ernst Jessen, Strassburg.

Sec'y-general—Florestan Aguilar, Madrid.

Assistant Secretaries—Burton Lee Thorpe, St. Louis; C. Van der Hoeven, The Hague; G. Villain, Paris; B. Landete, Madrid.

Treasurer—Edmond Rosenthal, Brussels.

Next place of meeting, San Francisco, August 30, 1915.

BURTON LEE THORPE, *Asst. Sec'y*.

NATIONAL MOUTH HYGIENE ASSOCIATION.

A SERIES of illustrated lectures on Mouth Hygiene is being prepared by this association for rental service. Address

EDWIN M. KENT, D.M.D.,
222 Washington st., Brookline, Mass.

OHIO STATE DENTAL SOCIETY.

THE forty-ninth annual meeting will be held in Columbus December 1st, 2d, and 3d. Papers on live subjects by able men Tuesday and Wednesday afternoons, clinics Wednesday and Thursday forenoons. The program is not sufficiently perfected to announce at this time, but a strong program and big meeting are assured. The entire state is now organized into components, and a very large attendance is anticipated.

F. R. CHAPMAN, *Sec'y*.

FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

Union Meeting.

There will be a union meeting of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at the Hotel Iroquois, Buffalo, N. Y., November 19, 20, and 21, 1914.

J. Porter Mallory, *Ch'man,*
Local Committee.

RHODE ISLAND BOARD OF REGISTRATION.

The next meeting of the Rhode Island State Board of Registration in Dentistry for the examination of candidates will take place at the State-house, Providence, R. I., on Wednesday, Thursday, and Friday, October 7, 8, and 9, 1914.

Wm. B. Rogers, *Sec'y,*
171 Westminster st., Providence, R. I.

ARIZONA BOARD OF EXAMINERS.

The Arizona Board of Dental Examiners will meet at Phoenix, Ariz., beginning October 5, 1914. Prospective candidates for examination should apply at once to Sydney P. Osborn, secretary of state of Arizona, at Phoenix, Ariz., for an application blank, and return same to him, properly filled out, together with the fee of twenty-five dollars.

J. Harvey Blain, *Sec'y,*
Prescott, Ariz.

MASSACHUSETTS BOARD OF REGISTRATION.

A meeting of the Massachusetts Board of Registration in Dentistry, for the examination of candidates, will be held in Boston, Mass., October 21, 22, and 23, 1914.

Candidates who have applied for examination will report to the secretary, Wednesday, the 21st, at 10 A.M., at Tufts College Dental Infirmary, Huntington ave., prepared with patient, rubber dam, gold, plastic filling materials and instruments, to demonstrate their skill in operative dentistry. The board in every instance selects the cavity to be filled. Partially prepared cavities never accepted.

The theoretic examination—written—will include operative dentistry, prosthetic dentistry, crown and bridge work, orthodontia, anatomy, histology, surgery, pathology, materia medica, therapeutics, physiology, bacteriology, anesthesia, chemistry and metallurgy, and will be held at Civil Service room, No. 15 State-house, commencing Thursday, 22d, at 10 A.M. Candidates are required to bring pens.

All applications, together with the fee of twenty dollars, if first examination, must be filed with the secretary of the board ten days before the date of examination, as no application for this meeting will be received after that date. (Candidates for second and subsequent examinations will be required to fill out an application blank (Form 2) and forward to the secretary as above.)

Every candidate for examination must be twenty-one years of age. Application blanks may be obtained from the secretary. Applications must be made out in candidate's own handwriting. Temporary licenses are never granted. The fee for third and subsequent examinations is $5.00.

G. E. Mitchell, D.D.S., *Sec'y.*

MARYLAND BOARD OF EXAMINERS.

The Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 5 and 6, 1914, at the Baltimore College of Dental Surgery, Baltimore, at 9 A.M.

For application blanks and further information apply to

F. F. Drew, *Sec'y,*
701 N. Howard st., Baltimore, Md.

CONNECTICUT DENTAL COMMISSION.

The Connecticut State Dental Commission hereby gives notice that it will meet at Hartford, November 19, 20, and 21, 1914, to examine applicants for license to practice dentistry in the state, and to transact any other business proper to come before it.

Application blanks, copies of the revised requirements, rules, etc., will be mailed by the Recorder upon request.

Edward Eberle, *Recorder,*
902 Main st., Hartford, Conn.

VIRGINIA BOARD OF EXAMINERS.

THE Virginia State Board of Dental Examiners will meet in the city of Richmond, Va., October 6, 1914, for the examination of applicants to practice dentistry in Virginia. The first session of the board will begin at 9 o'clock.

For particulars address

J. P. STIFF, *Sec'y*,
Fredericksburg, Va.

OKLAHOMA BOARD OF EXAMINERS.

THE Oklahoma State Board of Dental Examiners will hold its regular meeting at Muskogee, Okla., commencing December 7, 1914, at 9 A.M., for the purpose of examining applicants for license to practice dentistry in Oklahoma.

All applicants must present his or her diploma from a reputable dental college of good standing, of which the board shall be the judge.

The written examination will be upon subjects taught in our reputable dental colleges. Operative and mechanical dentistry will also be required, and applicants should come prepared with engines, instruments, and material for doing such work. Our law makes no provision for temporary licenses.

Applications should be filed at least ten days prior to date set for examination. Address

E. E. HEFLIN, *Sec'y*,
200½ W. Main st., Oklahoma City, Okla.

WISCONSIN BOARD OF EXAMINERS.

THE Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on December 14, 1914, at 10 A.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee to be filed with the secretary ten days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations. Special application blanks for this examination and $10 fee, together with high-school credits, to be filed ten days in advance.

S. H. CHASE, *President*,
W. T. HARDY, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

MICHIGAN BOARD OF EXAMINERS.

THE semi-annual meeting of the Michigan State Board of Dental Examiners will be held in the Dental College at Ann Arbor, commencing Monday, November 9th, and continuing through the 14th. For full particulars and application blanks address the secretary.

MICHIGAN LICENTIATES PLEASE NOTE.

The licenses of all Michigan licentiates, whether practicing in the state or not, who have not paid their annual registration fee, will be revoked at the next regular meeting of the board, which will be held in Ann Arbor, November 9th to 14th.

F. E. SHARP, *Sec'y*,
Port Huron, Mich.

INDIANA BOARD OF EXAMINERS.

THE next meeting of the Indiana State Board of Dental Examiners will be held at the State-house, Indianapolis, commencing Monday, November 16, 1914, and continuing five days. For application blank and full particulars address the secretary.

ANNUAL REGISTRATION OF DENTISTS.

Those wishing to register in Indiana, please notice!—In compliance with Section 9 an Act to Regulate the Practice of Dentistry in the State of Indiana, approved March 8, 1913: "On or before the 31st day of December of each year each dentist now licensed or subsequently licensed to practice dentistry in this state shall transmit to the secretary of the State Board of Dental Examiners his signature and address, together with the fee

of one dollar and the number of his or her registration certificate, and receive therefor a renewal license certificate. Said renewal license certificate shall be at all times properly displayed in the office of the one who is named in the license, and no person shall be deemed in legal practice who does not possess such renewal certificate. Any license granted by said board shall be canceled and annulled if the holder thereof fails to secure the renewal certificate herein provided for within a period of three months after December 31st of each year; provided that any license thus canceled may be restored by the board upon the payment of a fee of five dollars, if paid within one year after such cancellation."

Notices will be mailed to all dentists registered in Indiana to their last known address, on or before December 31, 1914. Failure to receive such notice will not be an exemption or an excuse for non-payment. In such cases all persons should notify the secretary, giving their correct address. This also applies to all those living outside the state.

Dr. Fred J. Prow, *Sec'y*,
Bloomington, Ind.

ARMY DENTAL SURGEONS.

Memoranda of Changes.

For the week ending July 18, 1914:

First Lieut. R. H. Rhoades granted leave of absence for two months, to take effect on or about July 1st.

For the week ending July 25th:

Raymond Miller, act.d.s., recently appointed, will proceed to Fort Bliss, Texas, and report to the commanding officer of that post for assignment to duty.

For the week ending August 1st—(No changes).

For the week ending August 8th:

Don G. Moore, act.d.s., has been granted fifteen days' leave of absence, effective about September 1st.

First Lieut. Harold O. Scott was directed to proceed to Fort Rosecrans, Cal., for duty, and upon completion of the same to return to his proper station, Presidio of Monterey, Cal.

For the week ending August 15th:

Raymond Miller, act.d.s., reports arrival August 8th for duty at Fort Bliss, Texas.

United States Patents

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST 1914.

August 4

No. 1,105,755, to Lewis A. Chamberlin and Charles H. Williams. Crown-post extractor.

No. 1,105,795, to William A. Johnston. Flexible tubing.

August 11.

No. 1,106,758, to Benjamin F. Walker. Dental floss holder.

No. 1,106,815, to William J. Hopkins. Dental instrument.

No. 1,106,894, to Orin C. Samphere. Dental mandrel.

No. 1,107,185, to Heinrich Schweitzer. Pressure apparatus for dental castings.

August 18.

No. 1,107,389, to Lee O. Waller. Dentifrice.

No. 1,107,631, to Peter N. Souzon. Securing device for dental brush mandrels.

August 25.

No. 1,108,290, to Faneuil D. Weisse. Set of teeth for practice work in dental surgery.

No. 1,108,449, to William N. Kidder. Artificial tooth.

No. 1,108,493, to Matthew N. Federspiel. Orthodontia pliers.

No. 1,108,570, to John M. Gilmore. Dental tool holder.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

THE EVOLUTION OF THE HUMAN DENTITION.

By JOHN HUMPHREYS, M.D.S., F.S.A., F.G.S., Birmingham, Eng.

(Report read before Section I of the Sixth International Dental Congress, London, 1914.)

DAWN of Mammalian Life. We have to penetrate to an age as remote as the early part of the Mesozoic or Secondary period of geological time, to a formation as ancient as the Trias, before the dawn of mammalian life is reached.

Theriodont Reptiles. In Triassic rocks of South Africa, Professor Seeley has discovered a class of mammal-like (Theriodont) reptilian forms to which the name Anomodontia (irregular-toothed) has been given, the teeth differing in pattern in various parts of the mouth. This anticipates by an enormous period of time the differentiation in the teeth of mammals which succeeded them. In their anatomical structure and heterodont dentition they suggest a relationship to primitive mammals, especially to the surviving monotremes of Australia. Professor Osborn states: "It is now generally believed that the Theriodontia are not far from the actual ancestors of the mammalia; they constitute the only group from which mammals could have descended."

Dawn of the Prototheria. During recent years the discoveries made in England, on the Continent, and in the United States of America have revealed primitive and lowly forms, showing that in Mesozoic times there existed small creatures allied to the group Prototheria, of which the duck-billed platypus and the spiny ant-eater are modern representatives. The type persisted, in Australia, but little changed throughout ages of geological time.

From Keuper beds in Bavaria, and from the same formation in Somersetshire, small teeth have been discovered with tuberculated crowns resembling those of platypus; to this creature the name Microlestes was given by Sir Richard Owen.

Dawn of Metatheria. From the Purbeck beds near Swanage a variety of early marsupial forms have been brought to light, such as Plagiaulax and Triconodon; the Stonefield slate of Oxfordshire has yielded Phascolotherium, the specimens indicating tiny creatures of insectivorous habits, whose small size

and greater intelligence probably preserved them from extinction. The Jurassic beds of Wyoming, and the Laramie Upper Cretaceous beds of the United States of America have supplied similar evidence of a rich marsupial life, which persisted throughout the Mesozoic period, the age of the great reptiles.

Commencement of Eocene. The close of the Cretaceous epoch ends the Secondary period of geological time, and with the dawn of the Eocene we are met with a startling change in the order of life. The monstrous reptilian forms, which had peopled the earth, the air, and the seas for myriads of ages, seem to have been suddenly blotted out of existence, and there appeared true mammals, ancestors of the dominant life of the present day; we pass straight from the age of reptiles to mammals, and the same fact is observable in European beds of similar age—the transition from one life to the other is apparently sudden and abrupt. Wortman comments on the very slow evolution of mammalian forms up to the end of this period, so slow as to be quite insignificant, judging from the teeth, and remarks that up to the close of the Chalk epoch there is not a vestige of Eutherian life—all the evidence is of marsupial forms, which have lived comparatively unchanged through the long ages of the Secondary period.

There are no intermediate forms between the minute Mesozoic marsupials and the true mammals first found at the commencement of the Eocene, as we might have expected; instead there are found in the earliest Eocene beds, associated with the small marsupials, mammals differentiated into various orders and sub-orders and similar to the existing mammalia.

Where did Mammalian Life Originate? It is to America that we must travel for information of the life existing on the shore lines of the Cretaceous seas; there, fortunately, ample evidence is preserved.

At this period there existed a continuous land belt uniting North America, Europe, and Asia, and penetrating into the heart of the polar regions, which for unexplained reasons then enjoyed a tropical climate. Wallace says one of the most startling and important of scientific discoveries of late years has been that of the relics of a luxuriant flora in the various parts of the arctic regions, and this fact is emphasized by Wortman in "Studies of Eocene Mammals." He remarks:

"In polar regions, Spitzbergen, Greenland, and Alaska, the climate at the end of the Cretaceous period, judging by the remains of fossil plants, must have been tropical; there grew cycads, conifers, pines, redwoods, and poplar, oak, plane, pine, beech, willow, ash, walnut, plum, together with tree-ferns, heath, cinnamon and magnolia. Spitzbergen has a rich fossil flora, which includes most of the above, and even in Grinnell Land, within eight and a quarter degrees of the pole, a similar flora existed.

"The similarity of fossil plants in North America and Europe would serve to indicate the origin of both the higher plants and at least some mammals within the polar regions."

It is probable that on this circumpolar land with its tropical vegetation, life was evolving and differentiating, and now the frozen North holds sealed up under snow and glacier the secret of the life of which we know so little.

In the Laramie beds of the oldest Tertiary deposits of New Mexico, Wortman informs us "there are found mingled together Eutherian as well as Mesozoic types; twelve genera represent entirely new and unknown types, and the Eutherian types are represented by Rodentia, Artiodactyla, Perissodactyla, Carnivora, Insectivora, and Primates; so that here in the very dawn of the age of mammals we meet with the strange spectacle of highly specialized and modern forms, including all the higher natural orders." This points to the extreme antiquity of mammalian life, and shows that the origin of true mammals must be sought in the far-away ages of Mesozoic time.

There is much evidence to show that warm-blooded life originated in polar regions, and radiated southward from

a center in circumpolar lands, from which it was distributed over North America and Northern Europe.

Dawn of the Primates. It is in this remote age, reckoned by millions of years, that we have revealed the first appearance of Primates in the lower Eocene measures of America. Small creatures have been found which bear a strong resemblance of the modern Tarsius inhabiting the forests of Indo-Malaya and Madagascar. The tarsius is a small squirrel-like creature with large prominent eyes and of insectivorous habits, spending an arboreal existence—an animal which at present is placed at the base of the living Primate stock.

Professor Fairfield Owen, writing of American Eocene Primates, states:

"Surprizingly modern is the tarsius-like Anaptomorphus, a short-faced, long-eyed, aberrant form, with teeth analogous to those in the existing tarsier (tarsius) of Madagascar"; and Professor Owen says that "there can be no question whatever of the near relationship of the two."

We have the strange spectacle of this small creature appearing in North America in the dawn of the Eocene, persisting practically unchanged throughout a vast period of time, and now inhabiting the dense forests of Eastern Asia. We must look to such a creature as Anaptomorphus as the ancestor of the Primates, including monkeys and man.

In these early Eocene beds in America occur other small forms, ancestral to Lemuroidea and Anthropoidea, existing together, and pointing to America as the original home of the lemurs and monkeys.

Hypsodus, of the Wasatch beds of the American Eocene, possessed a dental formula of

$$\text{in. } \tfrac{2}{2} \text{ c. } \tfrac{1}{1} \text{ p.m. } \tfrac{4}{4} \text{ m. } \tfrac{3}{3}$$

—the complete mammalian dentition, except the outer pair of incisors, which even at this early period have been suppressed.

Though the lower American beds reveal tarsius-like creatures, ancestral lemurs, and primitive platyrrhine monkeys, in no case were the molars quadritubercular—as yet all followed the tritubercular pattern.

Professor Elliott Smith, in his presidential address to the Section of Anthropology at the meeting of the British Association in Dundee in 1912, observes: "There seems to be ample evidence now to justify our sketching the genealogy of man and confidently drawing up his pedigree as far as Eocene times." He considers that North America may have been the original home of the Primates, the center from which radiated the ancestors of tarsius, lemurs, platyrrhine and catarrhine apes, and he comments on the fact that the evolution of the catarrhines was through a platyrrhine stock, as evidenced by anatomical structure.

The separation of the two classes, Lydekker concludes, is of long standing; vast changes in the disposition of the continents and the oceans have taken place since this was effected.

Dawn of European Primates. At the close of the Eocene in North America all traces of the Primates had disappeared, probably from a submergence of part of the continent, which forced life to the southward; there in Miocene times the Primates reappear in Patagonia as platyrrhine apes, and they have remained practically unchanged to the present time. At this period South America was united to Africa by a broad land bridge across the Atlantic; over this these primitive Primates may have migrated, or they may have traveled across the northern circumpolar land to Europe; in any case it is not until the middle of the Eocene that we have records of European Primate life, for according to Lydekker: "The earliest record we have as yet of the occurrence of apes is in the middle of the Eocene of Europe, where forms are met with closely allied to some of the existing types."

The Rheims lowest Eocene beds have yielded the most ancient forms of primitive lemuroids in Protoadapis and Plesiadapis, but unlike the American forms the molars are five-cusped instead of

tritubercular, and the cheek teeth probably numbered

$$\text{p.m. } \tfrac{3}{3} \text{ or } \tfrac{4}{4} \text{ m. } \tfrac{3}{4}.$$

In the English upper Eocene primitive creatures such as Microchœrus erinaceus have been found at Hordwell in Hampshire, bearing a strong resemblance to tarsius, with a similar dentition—

$$\text{in. } \tfrac{2}{1} \text{ c. } \tfrac{1}{1} \text{ p.m. } \tfrac{2}{3} \text{ m. } \tfrac{3}{3}$$

—and from the same horizon in England and from similar beds at Soleure in Switzerland, Adapis, a lemur form, has been discovered which differs from all existing lemurs in possessing four instead of three premolars.

At the close of the Eocene we are met by the remarkable fact that simultaneously in America and in Europe all traces of the Primates disappear, and what is more extraordinary, there is no evidence in Europe of the next, platyrrhine stage, the modern representatives of which are now confined to the American continent.

The lemurs, which were common in Europe and America in the Eocene, are now largely confined to the island of Madagascar, where during the later geological periods they have assumed gigantic proportions; Megaladapis insignis of the late Pleistocene must have been as large as a donkey. Numerous specimens from swamps and caves have been brought to light, showing that it has only recently become extinct. The living lemurs closely resemble their remote Eocene ancestors; they have continued almost unchanged to the present time, and we must discard them from the line of man's ancestry.

Oligocene. One of the most remarkable and interesting finds of late years was the discovery by Professor Schlosser in 1911 in Oligocene deposits in the Fayum, Egypt, of fossil forms of platyrrhine monkeys and also small primitive anthropoid apes, the latter with a dentition of

$$\text{in. } \tfrac{2}{2} \text{ c. } \tfrac{1}{1} \text{ p.m. } \tfrac{2}{2} \text{ m. } \tfrac{3}{3}.$$

"Parapithecus Fraasi" is represented by the mandible of a little creature about the size of a hedgehog, in which all the teeth but the right canine are present. The teeth are in series—there are no interspaces—the canines are not raised above the others, the molars are quadricuspid, the second being largest.

The points in the dentition to be noticed are, that the canines are on the same level as the other teeth, there is no attempt at specialization, there are no interspaces, and the teeth are arranged in a sweeping curve with an entire absence of parallelism as in the later anthropoids. In these particulars and in the diminution in the size of the molars from before backward, the human pattern is approached.

It is amazing to discover a creature so highly evolved and developed at a period of such great antiquity as to be almost unthinkable.

Miocene. In the next period, the Miocene, returning to Europe, we discover that in place of the Eocene lemurs the continent has become the home of varieties of monkeys and anthropoid apes. The remains are widely distributed. Hylobates antiquus from the French middle Miocene of Sansan was an ancient form of gibbon, and in this creature the canines were small; there were no diastemata in the upper jaw; the premolars were quite bicuspid-like, resembling human premolars. The second molars were largest, the upper molars possessed the well-marked anthropoid pattern of crown, but the cingulum was developed as a ring surrounding the cusps, as in the lemur-like Adapis magna.

Miocene Anthropoids. Dryopithecus fontani was another French Miocene anthropoid ape, probably as large as the chimpanzee, and is known by three lower mandibles from the middle Miocene of St. Gaudens in Southern France. It had many points of resemblance to the chimpanzee, the canines were strong, the second premolar larger in mesio-distal extent, and the incisors small and narrow.

Professor Schwalbe considers "that while the molars resemble those of man, this ape cannot be brought nearer, per-

haps not so near, the line of human ancestry as the other anthropoids." How far Dryopithecus may be regarded as a stem which on the one side led to the human race, and on the other to the living anthropoids by the chimpanzee, orang, gibbon, and gorilla, cannot as yet be certainly determined.

An important discovery of half the mandible of a large anthropoid ape in Spain last September has just been recorded by M. Vidal. It was found in late Miocène beds on the south side of the Pyrenees. The specimen suggests features resembling the chimpanzee, though there are important points of difference. Only three teeth are present, first, second, and third molars, all being quinquicuspid, and the third the largest.

The pit for the attachment of the tongue is shallow, and the lingual shelf of bone is absent, thus differing from the chimpanzee. The jaw in front is massive and thick, indicating the presence of large canines; the roots of the two premolar teeth are present, showing single roots instead of double, as in the chimpanzee, so that in this respect the teeth resemble human premolars.

Oreopithecus, a large ape from the middle Miocene of Monte Bamboli in Tuscany, is also a form of considerable interest, as it has points of resemblance to the anthropoid apes and the baboons. The upper molars resemble those of the anthropoid apes, the lower molars those of the baboons.

Dr. Ristori says, "It resembles Cynocephalus and Semnopithecus in the long dental series and the elongation of the last molars, but in the shortness of the face, rounding of the chin, and the diagonal arrangement of the molar tubercles, it approximates to the Simiidæ, of which it may have been an ancestral type."

Thus the old world or catarrhine monkeys and the anthropoid apes appear simultaneously in the Miocene of Europe.

Another monkey, Mesopithecus, from the upper Miocene of Pikermi, Attica, Greece, is related to the Macaques, and is considered by Lydekker "one of the most important representatives of this branch, which has characters in common with Macacus and Semnopithecus, to the latter in reference to skull and teeth."

With the close of the Miocene, anthropoid apes entirely disappear from Europe but reappear in India, where in the lower Pliocene of the Siwalik Hills in the Punjab, a portion of an upper maxilla of a large anthropoid ape was discovered; it was figured and described by Lydekker in "Rec. Geol. Surv. India," vol. xii, 1879, as Troglodytes Sivalensis, or Palæopithecus Sivalensis.

It has many interesting characteristics—the incisors were small, canines stout and powerful, with spaces between incisors and canines, the premolars narrow antero-posteriorly, more so than in the chimpanzee, and the last molars were the smallest, as in man.

It agreed with Dryopithecus in the smallness of incisors; with man in the narrowness of the premolars and small size of the last molars, and with the orang and chimpanzee in having the molar series in parallel lines, the second the largest, with well-pronounced anthropoid pattern of crown.

Sir Richard Owen considered it intermediate between the orang and gorilla.

In Europe several catarrhine forms have been brought to light from Pliocene beds at Montpellier in France, and in the brick earth of Essex, representing Cercopithecus and Macacus, the latter surviving to the present day as the Barbary ape, M. innuus of Gibraltar.

We have now surveyed the evolution of the Primates throughout the Tertiary period of the close of the Pliocene, and at the commencement of the Pleistocene age Man makes his appearance.

Man's Appearance. By the remarkable discoveries made during the last twenty years we have conclusive evidence in the fossil forms unearthed that man existed at a time estimated by many leading authorities as half a million years ago. Some geologists would refer him even to early Pliocene times, a million years farther back. Mr. Reid Moir has recently brought to light flint imple-

ments of human handiwork below the Red Crag in Suffolk. Professor Keith states:

"It seems highly probable that man as we know him now took on his human characters near the beginning of the Pliocene period; the estimates at hand give an antiquity of at least a million and a half of years."

The periods of geological time we have been examining are so enormous that the mind is staggered by the contemplation of ages so vast. Professor Sollas, one of the most distinguished of living geologists, gives the following estimate of the probable duration of the later stages of geological time:

Pleistocene . .	400,000	years
Pliocene . . .	900,000	"
Miocene . . .	1,800,000	"

while beyond this lies the Oligocene, and still farther back the Eocene, lasting for a period of even greater length, before we come to the dawn of mammalian life.

Pleistocene. The earliest evidence of a Pleistocene higher Primate was unearthed by Dr. Eugene Dubois in Java in 1891, in a formation which is now agreed to be lower Pleistocene. The discoveries consisted of a skullcap, molar tooth, and femur.

The former has a cranial capacity of about half the dimensions of the average modern man, and is much more simian than human in appearance. The tooth—the upper right third molar—is large, stout, and of primitive appearance, with the two buccal roots fused. The evidence points to a being with simian and human affinities; the complete absence of forehead indicates a degraded form to which the name of Pithecanthropus or *man-ape* has been assigned. Professor Sollas considers it should be included in the limits of the human family, and he remarks: "In the long ancestral series which extends upward from the apes to man, he has mounted far more than half way, and only a few steps of the long ascent remain to separate him from the species *Homo sapiens,* essential man."

In 1908 Dr. Shoetensack discovered a unique specimen of a human mandible in the gravels of the river Mauer near Heidelberg. It was found at a depth of 80 ft. from the surface, and the gravels have been assigned to the base of the Pleistocene.

The specimen was of great size, very massive, twice the thickness of the ordinary mandible, and of uncommon breadth. It had a short and square ramus, shallow sigmoid notch, and low condyles; the bone behind the molars was thickened enormously for the insertion of the temporal muscles.

In most of its characteristics it was akin to the anthropoids, especially in the absence of a chin, but the teeth were arranged in a broad sweeping curve all on the same level, without interspaces, and the first and second molars were of equal size. It was a jaw unlike anything ever seen before, with simian and human relations—a link between man and the anthropoids.

Piltdown Skull and Mandible. The discovery of human remains by Mr. Charles Dawson and Dr. Smith Woodward at Piltdown in Sussex in 1912 still further enriches our knowledge of primitive humanity. The name Eoanthropus has been assigned to this creature.

From the reconstruction of the skull and the mandible it is evident that though occurring on the same horizon as the Heidelberg mandible—the base of the Pleistocene—the fossils represent a different order of man.

The various fragments of the skull, from which the restoration was made, were of great thickness—twice that of modern man, and they were partly fossilized.

The orbital ridges, usual in the apes, were absent; the cranium was of ordinary capacity, but ill developed in front, the forehead being low and narrow. Prof. Elliott Smith considers the most noteworthy feature is "the pronounced gorilla-like drooping of the temporal region, and the feeble development of the part of the brain intimately related to the power of speech in modern man is very significant." The right side of the

mandible is quite simian in character, with short stout square ramus, shallow sigmoid notch, and entire absence of chin (the latter feature being more deficient than in any other specimen in existence). Internally the bone is projected into a flange, as in apes.

The tongue was attached in front to a hollow or pit, as in the anthropoids, instead of to tubercles as in man. The only teeth present are the first and second molars, both quinquicuspid, and much worn on the surface, showing that there was considerable lateral movement of the jaws.

In September last year a lower canine was found in the same place, which it is thought may have belonged to the specimen; it resembles the deciduous canine of an ape in pattern, and evidently did not project much above the line of the other teeth. This would be natural, as the creature is thought to have been a female.

The skull is considered to be the oldest human relic in existence, representing a form truly human, with a brain almost as big as modern man, but wanting in the higher characteristics; the jaws are quite simian, but with molars of human pattern and monkey-like canines reduced in size. It will help far more than any former discovery to elucidate the problem of the evolution of the human dentition.

Professor Keith considers that there were two races of mankind in the dawn of the Pleistocene, represented respectively by the Piltdown and Heidelberg remains.

Neanderthal Man. In the year 1856 a discovery of a skeleton was made in a cave at Neanderthal near Dusseldorf, which caused considerable speculation at the time. The skull was of a low and debased order, for although the cranial capacity was as large as in a well-formed modern skull, it was deficient in the frontal region owing to the smallness of the frontal lobes and the absence of forehead. The orbits were huge and round, encroaching on the forehead, and the great gorilla-like ridges over the orbits must have given the creature a savage and repellent appearance.

Mousterian Man. During the last few years several similar skulls and jaws, which have been unearthed in caves in the Dordogne limestone regions of central France, more fully explain the cranial and dental characteristics of this remarkable race. The jaws were prognathous, the lower mandible, as indicated by the Spy specimen, was massive and of great depth in front, there was an entire absence of chin, and the genial tubercles were missing. The molars increased in size from the first to the third, and the canine was large—all true simian characteristics. This race of Neanderthal, or as they are now called, Mousterian men, became extinct about the middle of the Pleistocene.

Professor Keith concludes that "Neanderthal man was not the Pleistocene ancestor of modern man, but represented a totally distinct branch of humanity, one which became extinct in Europe some time before the end of the Pleistocene period, the Glacial epoch which preceded the present."

The closing ages of the Pleistocene bring us with almost a shock into the presence of the Aurignacian and Magdalenian races of ancient hunters, who inhabited Europe south of the great ice-sheet, which then enveloped much of the continent.

Their remains and illustrations of their wonderful art exist in caves in central and southern France, and northern Spain, where the life-like paintings of the animals with whom they were associated, as the mammoth, bison, reindeer, and wild horse, executed by the Aurignacian race, and the splendid carvings on bone, slate, horn and ivory, of Magdalenian man, testify to their extraordinary artistic skill. Skulls of the Aurignacian hunters found in caves at Mentone exhibit in the prognathous negroid appearance of the jaws and teeth a resemblance to the bushmen of South Africa, but the Aurignacian was of much higher cranial capacity than his modern prototype.

The skulls of Magdalenian man demonstrate an intelligent race with large brains and with teeth and jaws similar to our own; all simian characteristics have disappeared, and the type of modern man has arrived.

SUMMARY.

The order of Primates today is represented with man at the head of the scale, and Tarsius, the little insectivorous Asiatic mammal, at the bottom, with intermediate forms of lemurs, platyrrhine and catarrhine monkeys, and anthropoid apes.

The human dentition has departed from the archetypal formula of

$$\text{in.}\ \frac{3\cdot3}{3\cdot3}\ \text{c.}\ \frac{1\cdot1}{1\cdot1}\ \text{p.m.}\ \frac{4\cdot4}{4\cdot4}\ \text{m.}\ \frac{3\cdot3}{3\cdot3}\ 44$$

—being now represented as

$$\text{in.}\ \frac{2\cdot2}{2\cdot2}\ \text{c.}\ \frac{1\cdot1}{1\cdot1}\ \text{p.m.}\ \frac{2\cdot2}{2\cdot2}\ \text{m.}\ \frac{3\cdot3}{3\cdot3}\ 32$$

—showing the loss of a pair of incisors and two pairs of premolars; in this, man agrees with the catarrhine monkeys and anthropoid apes.

Specialization must have commenced in a very remote age, for at the very threshold of mammalian life we are met with American Primate forms such as Hypsodus, where the incisors were reduced by the loss of a pair, although the full premolar series were present; the same fact is evidenced in the Adapis of the Swiss Eocene.

American Miocene monkeys show the reduction of the premolars by the loss probably of p.m.1, resulting in the characteristic p.m. $\frac{3}{3}$–$\frac{3}{3}$ which the platyrrhine monkeys retain to this day.

The second premolar was probably lost in Oligocene times, as the Egyptian Fayum beds show platyrrhine and catarrhine monkeys existing together; to this remote epoch we must look for further evidence of the separation and specialization of the two groups, for there is little doubt that the catarrhines have evolved from a platyrrhine source.

Let us consider the points of difference between the jaws and teeth of anthropoid apes and man. In the anthropoids the jaws are prognathous, there is an entire absence of chin, the tongue is attached to a pit in the region of the symphysis, the ascending rami are stout and squarish, and the sigmoid notch is shallow. The incisors, though human-like, are much stouter and thicker. The canines are developed as sexual and fighting weapons, diastemata exist in the upper jaw between incisors and canines to accommodate the closure of the lower canines, the upper premolars are implanted with three long roots, the molars increase in size from before backward, and are arranged in parallel lines which converge at the back; the three long roots in each are separate. The lower premolars are two-rooted and the molars are similarly implanted. The arrangement of the teeth is squarish, from the parallelism of the molars and the prominence of the canines.

In man the jaws are under the cranium and do not protrude, the mandible develops a chin with genial tubercles on the inner surface at the symphysis for the attachment of the tongue. The canines are reduced to the level of their fellows, there is no sexual difference; the upper premolars are implanted by single roots, though the first varies from single to two and occasionally even three roots, as in the anthropoids. The upper molars decrease in size from the first to the third, the roots in the last two being more or less fused. The lower premolars are single-rooted, and the molars decrease in size from before backward, the roots of the last two being frequently united. The teeth are arranged in a sweeping curve, diverging at the back.

Starting from the Oligocene we find that in the little Parapithecus the canines are not raised, there are no interspaces, the parallelism of the molars is absent; in fact the human arrangement is almost anticipated.

The specialization of the canines was a matter of gradual evolution which culminated in the existing great anthropoid apes, notably the orang and the gorilla.

In the early Miocene anthropoids, as

is evident in Hylobates, specialization had just commenced—the canines were feebly developed; in the large French anthropoid Dryopithecus the canines were assuming the proportions of sexual weapons, and by the end of the Miocene and commencement of the Pliocene, the Spanish and Siwalik examples show anthropoid apes almost similar to those of the present day.

The few fossil and recent forms of the man-like apes suggest that there must have existed many others which would have filled up the missing gaps and made clear the line of human dental evolution.

In the Miocene the great carnivora had appeared, and in the struggle for existence with which the apes were faced, the canines became enlarged as weapons of attack and defence; this was especially the case in the male, for the protection of the female and the young.

The result was apparent in the Pliocene, where in the Palæopithecus, a cousin of the chimpanzee, the canines attained large dimensions, resembling those of modern anthropoids.

Geological evidence, in the way of flint implements, demonstrates that humanity had come into being in the Pliocene period, and the Pleistocene discloses the remains of man himself, still however characterized by many simian features, as the pit for the attachment of tongue and the absence of chin.

The canines as weapons have disappeared; the arrangement and symmetry of the teeth are human—as we might have anticipated—and the only present visible suggestion of the former office of the canines is the raising of the corner of the lip to sneer.

The adoption of the erect attitude led to the perfecting of the hand, that marvelous piece of mechanism by which man's progress became assured; and in consequence of this came the increase in cranial capacity and intellectual development.

Instead of great fangs for tearing his prey and fighting his enemies, man had learned to fashion weapons for the protection of his kind and as instruments of the chase to procure food. It was the perfecting of his hands and the development of his brain that assured man's pre-eminence in the Primates, and these reacted upon his whole body, and especially left their mark upon his jaws and teeth.

Instead of the simple movement of opening and closing the jaws, caused by the interlocking of the canines, as in the anthropoids, the reduction of the canines to the level of the other teeth made a rotary motion possible, and an arrangement in a sweeping curve, as in the Heidelberg jaw, resulted.

The widening of the mandible supplied room for the greater movement of the tongue, and made articulate speech possible; and the pit to which it is attached in apes gave place to tubercles. The modification of the jaw in front, resulting from the changes in the dentition and the adoption of an erect attitude, ultimately produced the chin—the stages in its evolution are seen clearly through the Piltdown, Heidelberg, and Mousterian specimens; and the tongue attachment changes from the simian pit in Piltdown, through the Heidelberg mandible, and Mousterian man, to the genial tubercles in the Magdalenian race.

The Significance of the Human Dentition. When man first made his appearance, his skull, jaws, and teeth still retained many simian characteristics, proclaiming the lines of his ancestry, and suggesting that he, with his cousins the anthropoid apes, branched off at a very early period from the primitive ancestral stem.

So far no intermediate forms have been revealed between the Fayum Oligocene Primates and the large Miocene anthropoids, but our knowledge is rapidly increasing, as the recent important discoveries in Egypt and Spain plainly show.

We are still groping in the dark for evidence of the Pliocene being who fashioned the Norfolk flints: his work testifies to the fact that he was even then a reasoning being, with brain and hands so developed that he could design and fashion tools and implements. He

had thus provided much more effectual weapons than canine teeth, and had reached the stage of manhood. When we have evidence of him as true man at the base of the Pleistocene, his canine teeth are functionless as offensive weapons; as we travel down the vistas of the Pleistocene we note at every stage one simian character after the other disappearing, until at the end of the epoch man appears with skull and teeth of a purely human character.

May we not then regard the present human dentition as a case of probable reversion to such a type as is foreshadowed in the Primates of the Oligocene of Egypt?

We noticed the development in size of the apes during the Miocene, and the evolution of the canines as sexual offensive and defensive weapons—is it not probable that during that immense epoch one branch of the anthropoid family early adopted the erect attitude and perfected the hand, thereby developing the intelligence and reducing the size of its needlessly large canines?

Thus we are drawn to the conclusion that the human dentition, after passing through the various stages we have described, has at the end of its long period of evolution almost returned to the point from which it started, and reverted toward the primitive anthropoid arrangement as in Parapithecus.

Against this theory it is possible to argue that the case is one not so much of reversion as of survival throughout successive periods of this primitive dentition. Thus if man's handiwork appears in the early Pliocene period, it is reasonable to suppose that the hand itself was being evolved during Miocene times, which, as we have seen, witnessed the gradual enlargement of the canine teeth of anthropoids.

In short, man's ancestors may have evolved the hand as an alternative, not as a successor, to the great canine teeth of his cousin anthropoids, and may have preserved but little changed the dental arrangement of their common ancestor.

But against this suggestion it must be remembered that there is absolutely no geological evidence in the shape of fossil forms, and also the fact that all the earliest human remains retain so many simian characteristics. From Tarsius to Man is a long journey, but the stages of the ascent are being rapidly revealed, and the links in the long chain of evolution are yearly becoming more apparent.

THE EFFECT OF DIET UPON CONDITIONS IN THE ORAL CAVITY, WITH SPECIAL CONSIDERATION OF SCURVY.

By EDWARD B. RHINEHART, D.D.S., Schenectady, N. Y.

(Read before the union meeting of the Third and Fourth District Dental Societies of the State of New York, at Troy, N. Y.)

THE real subject of the paper is scurvy, which dates back to the time when sea navigation began, or at least it became generally known at that time, and was classified as one of the diseases of the skin. At that early date its causes were only vaguely understood, its treatment was crude, and its prognosis rather doubtful. After a comparatively few years, physicians better understood its causes and treatment, and yet before the days of steam navigation hundreds upon hundreds of lives were sacrificed to this disease. In the last fifty or seventy-five years, scurvy has been almost unheard of, excepting in some localities among foreigners, and during that time little has been written on the subject. I never heard or read anything on scurvy and its effect upon conditions in the oral cavity while studying in college, nor have I ever seen any article on the subject in our dental literature; yet I am convinced that even today, scurvy or its *symptoms* play an important part.

Only a few months ago a most pronounced case came under my observation for treatment; it was this instance, the history of which I shall now relate, that prompted this paper. Since the case came under my observation I have become intensely interested in the subject, and have read all I could find in medical works relating to this disease. Of the books published in recent years, "The Practice of Medicine," by Professor Osler, 1898, gives the best description, and it is from this work that some of the material in this paper was obtained.

CASE HISTORY.

In June last, a young man presented himself for treatment of his gums, which were very sore. The patient was of well-to-do German parentage, a college graduate, and an electrical engineer by profession. He was and had been for two years living in boarding-houses and restaurants. Upon questioning he said his habits were good, and that he was not suffering from any constitutional ailment, to his knowledge, nor was he under any treatment, but his gums had been sore for some time and bled freely when brushed. A few days before, they had become very sore and infected at the margins. I examined the teeth and found them in good condition, with the exception of a cavity in an upper canine; the only thing I found that could cause any irritation was a little calcarious deposit around the necks of the lower incisors and around the upper first molars, though this was not of sufficient quantity to cause such extensive inflammation, as the gums were quite swollen both on the upper and lower jaws, bled very freely upon touching, and were infected in the upper jaw at the gum margins from the third molar to the first bicuspid. I cleaned the teeth, removed the infected margins of the gum, and prescribed hydrogen dioxid. Again the teeth were carefully examined, as often a fragment of a toothpick will cause no little inflammation. I have seen cases in which from this cause the gums became swollen and infected, while the interproximal spaces were all free. The causes that came to

my mind then were suppurating gingivitis, syphilis, or the effects of mercurial treatment for syphilis. If anything looks suspicious in the mouth of a suspicious patient, we generally suspect syphilis—and rightly so, for no matter what they say, it has been my experience that young men, and old men too, when suffering from any venereal disease will usually make every effort to conceal the fact.

The patient was dismissed and told to call the following day. It was two days before he again presented. His mouth was in a much worse condition; he said he was suffering intensely, had not slept at all during the previous night, was very weak, and could eat nothing, as it was utterly impossible for him to masticate his food. His temperature was $100\frac{1}{2}°$; the gums were badly swollen and infected at the margins nearly all the way around the upper jaw. The infected portion was again removed and the margin touched with carbolic acid. The swollen, inflamed gums were painted with compound tincture of benzoin, and the patient was dismissed until the next day. The treatment did no harm, but of course gave no relief. The next day he presented toward evening, about one and one-half days having elapsed since I last saw him, and four and one-days since he first called. The condition of his mouth as it then appeared simply beggars description. The gums of both jaws were swollen very badly; in the upper jaw they nearly covered the teeth, and in both jaws they were infected from third molar to third molar. The tongue was swollen to twice its normal size, the mouth flooded with saliva, so much so that he had to place a large handkerchief to his mouth when trying to talk. The patient complained of feeling dizzy and faint; he was very weak, as he had eaten comparatively nothing, and slept only a few hours in the four and one-half days. His temperature had gone up one degree, now registering $101\frac{1}{2}°$, his breath was indescribably foul, and even the pressure of the tongue against the gums in talking caused the mouth to fill with blood. I was at a loss as to the nature or cause of the trouble, for I knew then that it was not syphilis or ulceration. I called in a physician, not expecting that he could help me out in the diagnosis, but wishing him to see the mouth, which to me was a pathological curiosity. It was he who noticed some of the external symptoms of scurvy —the rough dry skin with decided pallor, a swelling around the eyes, over which the skin had the color of a bruise, and submucous hemorrhages in the mouth. It was then learned that the patient had not slept well for several weeks, had suffered from headaches, had lost in weight, and was beginning to think that he was overworked and needed a rest. Further questioning brought out the fact that he *ate no vegetables;* he stated that he had not eaten them more than a half dozen times in two years, as there was not one he liked. Therein, of course, lay the secret of his trouble. He had simply starved his system of the organic salts, particularly the potassium salts present in fresh vegetables and fruits. The patient had lived upon bread and butter, meats, coffee, and desserts. The outcome of this long-continued diet was scurvy. The infected margins were again removed and glyco-thymoline prescribed. The patient was then ordered to eat no meat for a few days, to suck the juice of eight or ten lemons and to eat at least a dozen oranges daily, also of all the vegetables, particularly lettuce and cabbage. I saw the patient nearly every day for the following two weeks. At the end of that time the symptoms in the oral cavity had entirely disappeared, which proved the correctness of the diagnosis.

ETIOLOGY OF SCURVY.

Little is known concerning the pathology of scurvy. Evidence of profound anemia is always present; the skin may show spots of subcutaneous hemorrhage, and bleeding into the articulations of muscles may at times be noted. The chief causative factors are an unsuitable dietary and long-continued unhygienic

surroundings, excessive muscular exercise, mental anxiety, and depression also often play an important part in causing scurvy. The aged are very susceptible, and all ages are liable to the disease.

SYMPTOMS.

Scurvy is of slow onset. The early symptoms are a swelling around the eyes; the face is pale and looks bloated, and there is a noticeable gradually increasing debility, inability to perform mental or physical labor, and despondency. With rare exceptions, the gums swell, sometimes enormously, and become spongy; they often become infected, and may be, though rarely, fungoid in appearance. The teeth sometimes become loose, and in rare cases drop out. The breath emits an offensive odor, which is sometimes due to necrosis of the jaw. The tongue swells, though it is usually clean, and is often pale. There is a loss of appetite, but the digestion is in most cases good. The skin is dry, and of a muddy color. At the end of a week or ten days, capillary hemorrhages may appear upon the legs, arranging themselves about the hair follicles. The heart may present symptoms such as palpitation and feeble pulse. The temperature is sometimes subnormal, and the presence of fever is a certain indication of some complication.

TREATMENT.

For treatment, Professor Andrews recommends, as do all authorities, fruits and fresh vegetables; of the latter, potatoes, watercress, raw cabbage, and sauerkraut to be given in liberal quantities, but states that meat, eggs, milk, etc., should not be prohibited, as the patients require *all* forms of food to invigorate the system and render normal the constituency of the blood.

In treating the oral conditions, this writer recommends for the infected gums a solution of potassium chlorate; for the swelling a two per cent. solution of tannic acid, and a combination of boric and carbolic acids in a solution of suitable strength to be used as a mouth-wash.

LAND SCURVY AND INFANTILE SCURVY.

Some of the more recent writers claim that land scurvy is on the increase. Dr. McGraw, in 1904, reported thirty-two cases in Chicago, chiefly among the Poles, but a few cases occurred among the comparatively well-to-do. A disease which was originally considered acute rickets, but later described as infantile scurvy, with the same symptoms as scurvy in adults, is on the increase in this country, presumably owing to the extensive use of prepared foods. The absence of the citrates and lactates in these foods is claimed to be one of the most common causes of infantile scurvy.

PRACTICAL DEDUCTIONS.

I have met with disease conditions in the oral cavity, such as profuse bleeding and swelling of the gums, and have noted infection at the margins, yet could find no cause of the trouble, as there was or had been no constitutional ailment and the patient seemed in normal health. These conditions did not yield to treatment. I have talked with other dentists upon this subject, and they claim to have met with these same obstinate disease conditions of the gums.

In view of the fact that infantile and land scurvy are claimed to be on the increase, is it not well, when patients place themselves in our hands for treatment, for us to have scurvy in mind, or its first symptoms, which always appear in the oral cavity? And when we suspect these scurvy symptoms, it behooves us to look into the hygienic surroundings and the dietetic habits of the patient, and by simply giving good prophylactic advice we may save patients much annoyance and pain, and earn their gratitude.

After seeing the case of scurvy here described and after reading the literature relative to this subject, I am thoroughly convinced that diet has a most pronounced effect for good or for evil upon conditions in the oral cavity.

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, D.D.S.Univ.Pa., L.D.S.Edin., Edinburgh, Scotland.

(Continued from page 1147.)

(VII.)

CHAPTER X.—Bridge Work.

In the following papers, in which it is proposed to deal with the use of tube teeth and porcelain rods in bridge work, no attempt will be made to deal exhaustively with the mechanical, hygienic, or physiological principles of the subject, as it will be taken for granted that the reader has sufficient knowledge to prevent his undertaking the construction of a bridge in which one or more of these principles would be violated. As the subject is such a wide one, it is further proposed to confine this chapter to a brief description of the method of constructing porcelain bridges from porcelain rods.

With regard to the use of tube teeth in bridge work, it may be stated at the outset that their sphere of usefulness is here more restricted than in crown work, for the reason that the method of attachment sometimes necessitates the use of such an amount of gold for the purpose of giving the needed basal support that either an insufficient amount of self-cleansing space is provided or else the strength of the porcelain is unduly sacrificed. If the bite is an open one, or even moderately open, then these objections are less marked. At the same time, tube teeth are better suited for bridge work than any of the other forms of plain teeth or detached-post crowns, and readily fulfil all the conditions for which these are considered specially fitted, while they have the added advantages which were apparent in connection with their use in crown work. Attention is here directed to the importance which the writer attaches to the employment of tube rods used horizontally for this purpose, and the advantage obtained by the use of horizontal posts or bars, whereby great strength is obtained without adding to the bulk of porcelain, or appreciably weakening it.

It is not considered necessary here to enter into the early history of porcelain bridge work. What may be termed the modern attempts to establish a satisfactory system of porcelain bridge work originated in the efforts of Laud and Parmley Brown. These, taken up with much enthusiasm for a time, failed to fulfil the promises to which they gave rise, and this is not surprising when one considers how inferior, with regard to strength, fused porcelain is as compared with manufactured porcelain. Other objections there are in plenty—difficulties in connection with fusing, such as shrinkage, warpage, and color, as well as the time and labor involved. But the deficiency with regard to strength is alone sufficient to relegate the use of fused porcelain to a limited number of cases. There is, however, one important point in connection with fused porcelain bridge work upon which all writers are agreed, namely, that fused porcelain alone must not be depended upon to provide any of the strength of the piece, though some authors make this concession grudgingly, and with qualifications which neutralize their arguments in its

favor. In consequence of this defect, it is necessary to employ an iridio-platinum framework of sufficient strength to withstand all likely strains; indeed, it must be calculated as constituting the strength of the bridge without any dependence being placed upon the strength of the porcelain. At the same time, such strength as the porcelain possesses must be conserved, and so the metal framework, or substructure, must be constructed with the object of interfering as little as possible with the continuity of the porcelain, otherwise fracture or chipping of the latter will result. Indeed, it is almost impossible to avoid this if the porcelain is at all thin, and this is another of the difficulties to be faced. The framework, then, is of the utmost importance, and the details of its construction call for much care and thought in order to avoid the many pitfalls associated with this work. Usually the framework consists of an iridio-platinum saddle, supplemented by the addition of a wire or bar of the same, to which the pins of the teeth are soldered with 25 per cent. platinum solder. Such a framework frequently receives additional supports. There are few cases in which it is safe to dispense with the metal saddle, and these are confined to very short bridges, not subjected to the strain of biting. In the case of a posterior bridge an iridio-platinum base or saddle is imperatively necessary. The conditions, therefore, which are essential to the successful employment of fused porcelain include those in which ample space exists to permit of sufficient bulk of material, and those are confined to a very limited class, in which absorption is in excess of normal. Even when these are met with, and room is found for the various metal parts and porcelain facings, little is left for the porcelain body. Except in those somewhat uncommon cases of extensive restoration where the gum body is employed, it is hard to see what advantage is gained by the use of fused porcelain. Much has been claimed for it on esthetic grounds, but when these claims come to be examined, they seem to rest upon a somewhat slender foundation, as it must be apparent that what is gained in this way is due more to the facings than to the fused porcelain, which occupies a subordinate place. The hygienic claims advanced in favor of fused porcelain are undoubtedly sound, but these are not infrequently neutralized by the liability to chipping and fracture already spoken of.

The foregoing objections to the use of fused porcelain appear to impose a sufficient barrier to further extension of its use in this direction, unless, as mentioned in dealing with this subject in crown work, a variety of porcelain can at some future time be produced which is free from the defects that so far have resulted in such a marked inferiority on the part of fused as compared with the manufactured product. Such a contingency, however, seems too remote to warrant us in directing our activities along the lines of construction. Our energies would be much better employed in an endeavor to improve the quality of porcelain with regard to strength and color, and do away with the equally serious disadvantages imposed by its excessive liability to shrinkage. Meanwhile, it is hoped that advantage will be taken of the means at our disposal in connection with tube teeth and porcelain rods, as these yield all the advantages claimed for fused porcelain, and in a manner of which the latter is incapable. By far the greater number of cases can be successfully treated by the use of porcelain rods shaped-up to meet the requirements in the manner hereafter to be described, which follows closely the lines laid down in connection with the application of tube teeth and porcelain rods in crown work.

It is proposed, then, to deal here mainly with this part of the subject, as the methods of employing tube teeth have been sufficiently described in connection with crown work, while such modifications as are necessary to adapt them to bridge work will be apparent. Moreover, the numerous descriptions given in connection with the application of the various forms of removable crowns for this purpose would serve equally well

in the case of tube teeth, because we have already seen that the tube tooth can be quickly adapted, if need be, to any form desired, while in itself it is superior to all of them in point of adaptability and in other ways.

The various forms of tube rods have been illustrated in Chapter II, while in Chapter VIII have been given numerous illustrations of two or more crowns shaped-up from the double-tubed rods, with the tubes in the vertical position, as in ordinary tube teeth. By the use of the shaded rods previously referred to, with the tubes in a horizontal position either of the principal colors may be used to form the incisive or cervical portions of the tooth as best suits the case; or the rods may be shaped-up in most cases in such a manner that the middle portion where the two shades blend may be given such place as may be desired. In this manner as great a range of adaptability with regard to shade may be obtained as by any form of plain tooth. The foregoing description with regard to the variations of shade has reference to the rods when the tubes are used horizontally, but it is obvious that further variations may be obtained when they are used vertically. By using these rods horizontally, instead of vertically, almost any form of bridge may be shaped-up from them, the limitations with regard to their use being governed chiefly by two factors, namely, strength, and the ability of the operator in shaping the material to meet the requirements of the case. The question of strength will depend mainly upon the length of the bridge and closeness of the bite, and unless the latter is abnormally close, manufactured porcelain of good quality, even without added support, affords ample strength. By the method under consideration, however, additional strength is imparted to the piece by means of the horizontal posts or bars, which would show on cross-section as great an amount of metallic support as is found in the ordinary gold bridge with porcelain facings, and owing to the greater tensile strength of these rods compared with a like bulk of solder—upon which the ordinary gold bridge is made mostly to depend—the comparison in favor of the porcelain bridge is more marked. Moreover, these bars add nothing to the bulk of the piece, while they add to its strength, and heavier bars may be employed by the simple expedient of enlarging the tube in the tube rod by means of a diamond reamer.

There remains, then, the question of skill, and also that of the time necessary to form a bridge in the usual way. Skill is largely a matter of practice, but factors which contribute to its acquisition are a thorough knowledge of the surface anatomy of the teeth and of the various types to be met with. This knowledge should be part of the ordinary equipment of students as well as practitioners, as without it no fair comparison can be drawn between the usual forms of crown and bridge work, and the methods under consideration. The importance of this is worth realizing, because it must be apparent that without such elementary knowledge much time will be lost in deciding where to grind. Some of the illustrations given in previous chapters will show that where the matter of tooth-shaping is not involved, the amount of porcelain which can be removed is greater than the bulk of the average tooth, and so the question of the mere removal of a given quantity of porcelain within a given time is practically of little moment. It naturally follows, then, that the greater confidence one has in knowing where to grind, the more rapidly the desired result will be obtained. Undoubtedly, the man with artistic instincts will excel the man who is less fortunately endowed, and will obtain more satisfactory results. At the same time he will often be tempted to expend extra time in the niceties of tooth-shaping. Once some experience has been gained, a point is quickly reached where progress becomes disappointingly slow, but this stage is generally of short duration.

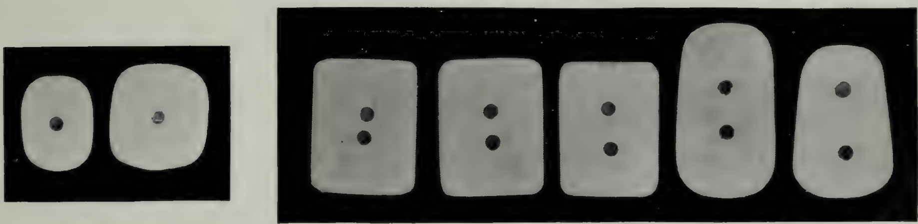
Along with some of the illustrations

shown in connection with these papers, a record is given of the times* taken to shape up crowns and bridges in various stages, and from these the reader should be able to form a fair estimate of the time necessary for the average case.

In dealing with artistic work, possibly the question of time should not have been given such prominence, but as men are frequently deterred from adopting new methods because of their supposed difficulty, and the fear that they may involve too much time and labor without adequate compensation, these times have been given in order to confirm what has been already said with regard to the advantages in the matter of time-saving. This, however, is the least powerful of the arguments in favor of shaping up bridges from tube rods. Before quitting this subject it may be well to remind the reader once more that time may be conserved in the manner spoken of in dealing with crown work, where it was suggested that a part of the shaping up may be left to a mechanical assistant; in fact a skilful mechanic can usually be trusted to do the whole of the work. Practical experience has proved that most mechanical assistants, and pupils also, after having had a fair amount of experience, quickly learn to do good work, doubtless for the reason that it appeals strongly to their manipulative as well as their artistic dexterity. Moreover, it is a welcome change from the usual routine of prosthetic work.

The selection of the rods which will give the best results with the least expenditure of time and labor is a matter of experience. Judging by the eye alone, the tendency is to select a larger size rod than is necessary. In consequence it is best to measure the maximum length and breadth of teeth which will be required, while, with a view to obtaining sufficient porcelain to cover the cap or caps if these are employed for anchorage, the depths will also require to be taken into consideration.

FIG. 119.



A B

End views: A, Of rods 24 and 25. B, Of rods 26 to 30.

Until sufficient skill is acquired in judging of the most suitable size of rod by the eye, it is best to use a small flexible millimeter measure, and a pair of dividers. The position of the tube, or, in the case of double-tube rods, of the tubes, in connection with its position in the finished piece, is also a matter which requires careful consideration, as upon this position the question of anchorage and strength largely depends. No disadvantage arises from the employment of a rod larger than is necessary other than that which results from the extra time and labor involved in the grinding and shaping.

The rods which will be found most

* Possibly the reader will note considerable differences with regard to these times. This arose from the fact that the specimens were prepared by individuals with varying degrees of experience; some were prepared by a mechanical assistant and pupils who had had little experience, some by a mechanic who had had a great deal of practice, while others were prepared by the writer and his partners.

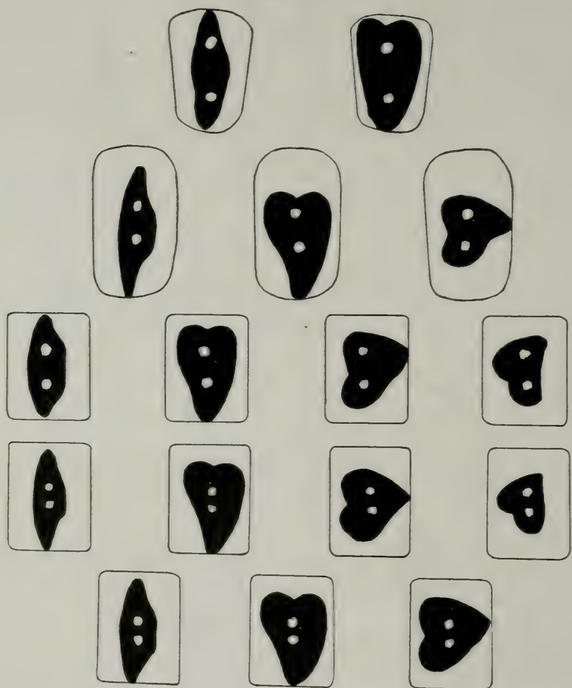
generally useful are single-tube rods Nos. 24 and 25, and double-tube rods Nos. 26 to 30 inclusive, the outlines of the ends of which are given in Fig. 119. The single-tube rods Nos. 24 and 25 will be found to provide sufficient material from which to shape up bridges in which the teeth are of moderate size or length (Fig. 120), while the double-tube rods, Nos. 26 to 30 inclusive, in which the tubes are 1, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, and $5\frac{1}{2}$ millimeters apart respectively, may be substituted for the single-tube rods, and owing to their larger size allow of wider application (Fig. 121). Moreover, they provide increased anchorage and strength in the cases of very shallow or close bites, particularly when used as in Fig. 122. It will be apparent, therefore, that there are few cases which cannot be met by the use of one or other of these rods.

FIG. 120.

End view of single-tube rods 24 and 25, showing outline of teeth.

The method of shaping up a tube rod to form a porcelain bridge differs only in some minor details from that followed in shaping up two or more teeth from a double-tube rod, and is briefly as follows: A model and bite having been obtained, a suitable rod is selected and a section is cut off a trifle longer than is necessary to fill the space between the

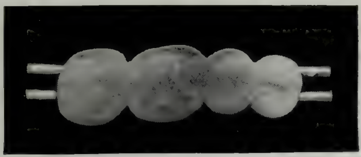
FIG. 121.



End views of double-tube rods 26 to 30, showing outline of teeth.

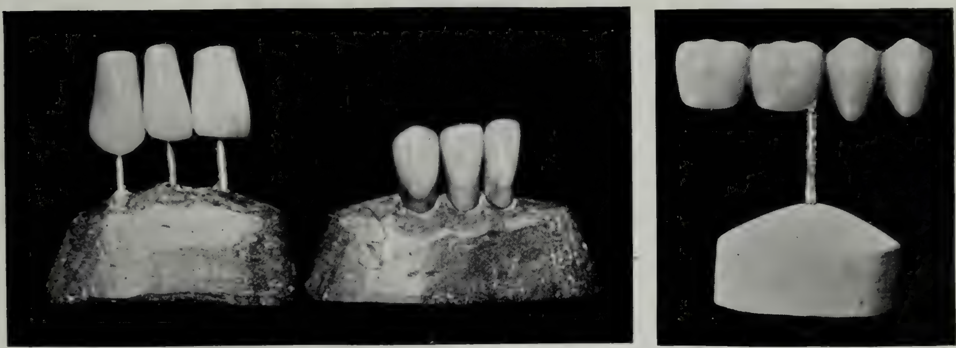
abutments. Having decided upon the number of teeth which will be required

Fig. 122.



Double-tube bridge for shallow bite.

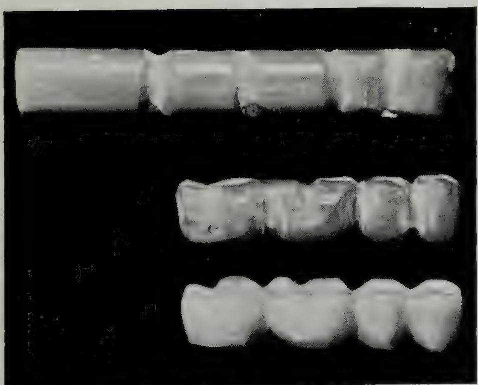
Fig. 123.



A B C

Models from which to shape up porcelain block.

Fig. 124.



Shows three stages in shaping up a bridge from single-tube rod.

to fill the space, select teeth of suitable shape and size, and rough-fit them to the space; then fix them on to a small block of wax or gutta-percha, and having adjusted them, remove the block with the teeth in position, and preserve it as a model from which to shape up the porcelain block (Fig. 123). Next calculate by the eye or by actual measurement the size of the individual teeth, and mark them off on the rod (Fig. 124), and with a suitable wheel on the lathe roughly outline them. Further careful shaping up will allow the rod to be fitted into the space between the abutments, a trifle having been removed from the teeth on the model to allow for the final finishing, as described in Chapter IX. The fitting and shaping should be continued, and the teeth given the necessary form before they are finally fitted to the gum margin and to the bite. In doing so, it is well to remember

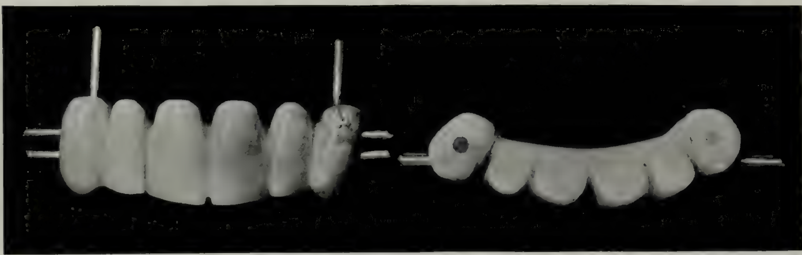
Fig. 125.

Bridge of three upper incisors.

that the division between the teeth should at the outset be made pronounced at their cervical margin, and continued on their labial surfaces in a gradually decreasing degree, until the incisive edge, in the case of the front teeth, is reached (Fig. 125), otherwise spacing between the teeth at that point will result. In order to correct such a fault, when spacing at the incisive edge is not desired, it will be necessary to grind off the labial surface so as to reduce or obliterate the cut. The danger spoken of is less in the case of the grinding teeth, owing to the rounded shape of their buccal surfaces, and this applies more particularly in the case of the bicuspids than it does in that of the molars.

Throughout the shaping-up process, care must be taken that the tube or tubes are maintained in the position which will afford the best anchorage for the bars, while at the same time they are not permitted to obtrude on the labial or buccal surfaces, except, of course, in cases where this cannot be avoided. For instance, in forming a bridge in one piece, involving the four incisors and canines, where the arch is a normal one, and employing for the purpose one of the rods 25 to 30 inclusive, the tubes will probably become exposed on the disto-labial surface of one or both canines (Fig. 126), and in the case of a V-shaped arch with four incisors, the tubes may become exposed on the disto-labial surface of the laterals (Fig. 127). In order to avoid this as much as possible and obtain the maximum amount of porcelain labially, that is, in front of the tube or tubes, care should be observed during the shaping-up process to leave the shaping-up of the labial surfaces of the central incisors until near the end of the work.* Generally speaking, therefore, it is better to leave the glaze at this point, or at a point on the surface of what will be the most prominent tooth or teeth in the finished case, as a guide, in order that too much may not be inadvertently removed before the shaping up is well on the way; otherwise it is often difficult to estimate the relation of the tube to the labial surface of the teeth if the glaze has been removed at an early stage. In this way the bar or bars need show very little, if at all,

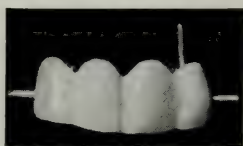
FIG. 126.



A B

Bridge of six upper front teeth, with anchor bars showing on disto-labial surface of canines.

FIG. 127.



Bridge of four upper incisors for contracted arch.

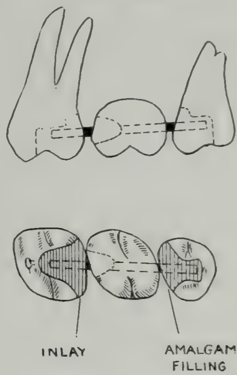
* Since the papers were begun, provision has been made for meeting this in similar cases involving the six anterior teeth by the inclusion of a pair of curved blocks whereby the danger of exposing the ends of the horizontal posts is done away with.

and if the canines in the case of a six-tooth bridge are shaped up so that they overlap the laterals, and at the same time are slightly turned on their axis, or in the case of a four-tooth bridge the laterals are shaped up so that they are overlapped by the centrals, the risks of exposing the tubes are still further decreased. Should the bars be exposed, however, they may be smoothed off to look like two small fillings; or they may be joined together in one by an inlay formed on the end of one of the bars.

FIG. 128.

A, Tube normal size. B, Tube enlarged.

FIG. 129.

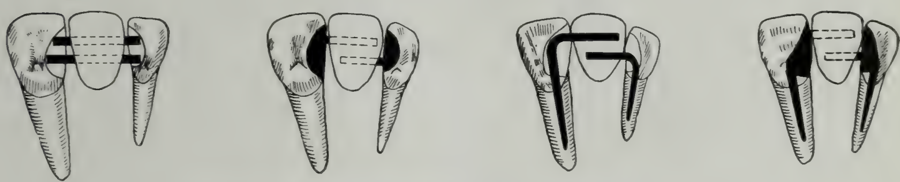


A simple form of bridge.

While nearly all the forms of anchorage suited to other forms of bridge work may be used in connection with tube rods, there are others to which they are peculiarly adapted, and one reason for this is that anchorage can be formed

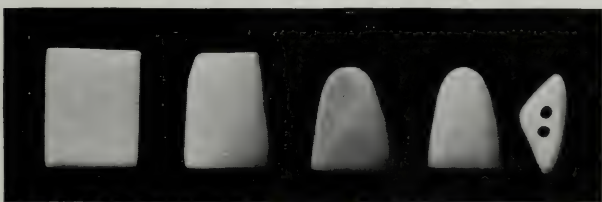
FIG. 130.

A B C D



Various forms of attachment as described in text.

E



1 2 3 4 5

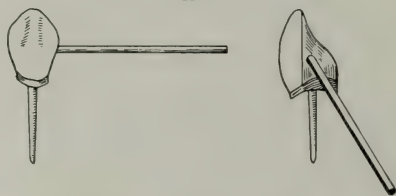
Stages in shaping up a central incisor from double-tube rod. 1, Section cut from block; time, 3 min. 2, Rough shaping up; time, 6 min. 3, A further stage; time, 3 min. 4, Shaping up completed; time, 18 min. 5, Side view. (To this would have to be added 10 min. for smoothing and polishing. Total time, say, 30 min.)

through any convenient part of the body of the bridge, and from either end, and such anchorage can be obtained not only without weakening the bridge or adding to its bulk, but also giving it a distinct gain in strength. This, as we have already seen, results from the presence of one and in some cases two bars, which in themselves are strong enough to sustain any amount of strain which the anchorage teeth themselves would stand, and where it is considered necessary, additional strength can be readily obtained by enlarging the tube by means of a diamond reamer and substituting heavier or stouter bars. If need be, still greater strength can be imparted to the bridge by further enlarging the end of the horizontal tubes, and carrying the inlay or inlays into the body of the porcelain. Tubes, also, into which solid posts are inserted may be employed, and so vertical as well as horizontal anchorage may be had in a variety of ways, and some of these will presently be figured and described, but before doing so it is well to note that in connection with porcelain bridge work it is not infrequently necessary to drill an extra tube in a porcelain rod for the purpose of affording anchorage for a post; and as drilling holes in porcelain is usually looked upon as a somewhat tedious operation, a few words as to the best method for its accomplishment seems called for.

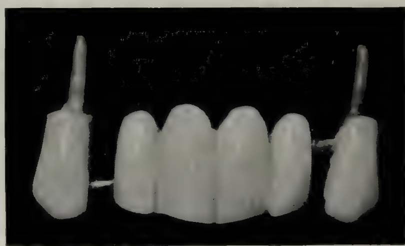
Much depends upon the drill employed, and most of all upon its cutting qualities, because it is not every diamond drill sold for the purpose that will cut well; indeed, some are quite worthless, and so it is well at once to discard these. Diamond drills may be had in a size suitable for drilling a similar tube to that in the non-platinum tube teeth and rods, and in selecting a drill for the purpose care should be observed that the steel setting does not project beyond the diamond cutter. If it does so, it will prevent the drill from cutting deep enough, at least until the steel shoulder has been worn down by friction with the side of the tube. Given, however, a suitable drill, the work may be accomplished much more easily and quickly than one would suppose. It is essential for the proper carrying out of this process that the drilling be done under water, and very little pressure should be applied. A rubber cup similar to that shown in Fig. 105, Chapter VIII, or one of larger size which will hold a porcelain rod, should be used, and the drilling carried out in the manner described in connection with "Grinding under water." Or a shallow vessel filled with water should be employed, in the bottom of which a piece of rubber is placed, upon which the tooth is held while the drilling is being carried out. Or in like manner it may be stuck in a piece of lac.

Fig. 131.

A



B



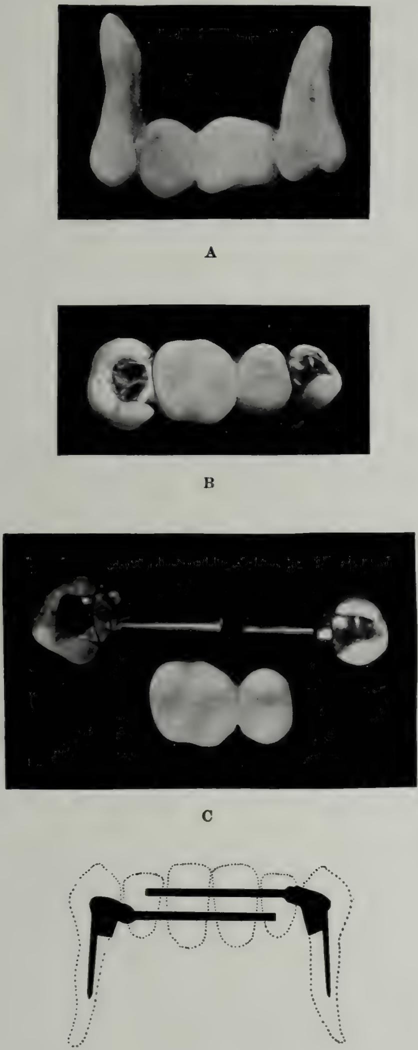
Four upper incisors, from double-tube rod, with horizontal bar soldered to Richmond crown to form anchorage for bridge.

With regard to the time necessary to drill a tube in a porcelain rod, a series of experiments has proved that such a tube can be drilled through rod No. 25 to the horizontal tube in about five minutes. Under ordinary circumstances, then, a sufficient time to allow for this would be, say, from ten to fifteen minutes.* A tube may also be drilled in the

* Most dental depots will undertake to drill these holes for a small sum.

same way by means of a Butler's point, medium grit, mounted on a porte-polisher, and thinned down to size No. 4

Fig. 132.



A, B, C, Three views of upper left bridge. D, Sketch of upper incisor bridge with similar type of anchorage.

wire. It is astonishing how fast such a point will cut, and how much pressure can be used without breaking it. Once a tube has been drilled, no matter how small it may be, it can very quickly be enlarged by means of Ash's diamond reamers, and for different purposes in connection with tube teeth and porcelain bridge work these will frequently be found useful.

Fig. 128 shows the side view of an upper molar with the tube normal size, and also enlarged to carry a heavier bar. The simplest form of bridge, such, for instance, as that where a first or second upper molar is missing, and the teeth on either side of the case have approximal fillings, could be most satisfactorily dealt with by means of such a tooth shaped-up from a porcelain rod, and the tube countersunk on one side to prevent rotation, and an inlay formed on that end of the bar and extending into the cavity (Fig. 129), while the other end could be anchored into the filling in the other tooth.

Another method is that shown in Fig. 130, where it will be seen that a front tooth shaped-up from a double-tubed rod may be employed and anchorage obtained in several ways, as follows:

(A) By anchoring the bars into fillings in the approximal surfaces of the adjoining teeth.

(B) By forming inlays on the bars which fit cavities in the adjacent teeth.

(C) By employing posts anchored into one or both of the canals of the anchorage teeth, with or without inlays formed on them, and joining them to the horizontal bars.

Instead of inlays, Richmond crowns can be used for this purpose, as seen in Fig. 131.

METAL TUBE AND BAR ANCHORAGE.

The use of a horizontal metal tube carried through the body of the bridge is seen in Fig. 132, which shows an upper left bridge, consisting of a bicuspid and molar, in which the bicuspid is devitalized, and a post with inlay attached is employed for the purpose of obtaining anchorage, at the same time forming a large contour inlay for restoring the lost tooth's substance. The inlay, it will be observed, also carries

the solid post for completing the anchorage into the tube attached to the molar inlay. Both inlays are extended into countersunk cavities in the porcelain to prevent rotation.

(To be continued.)

SOME HINTS REGARDING THE MANIPULATION OF ANATOMIC ARTICULATORS.

By EDWARD KENNEDY, D.D.S., New York, N. Y.

(Read before the New Hampshire Dental Society, at its annual meeting, Weirs, N. H., June 17, 1914.)

THE subject of anatomical articulation is too broad to allow of an attempt at an exhaustive scientific analysis in the short time allotted to this paper. I shall therefore confine myself to a discussion of the manipulation of anatomic articulators.

Most dentists have, in my opinion, neglected to use these instruments, as only two per cent. of the dentists of the United States actually employ them, because they consider them to be too complicated and to take so much time that their use is not practical.

A glance at the history of anatomic articulation shows that since Dr. Bonwill laid down the first principle of anatomic articulation a number of investigators, such as Walker, Christensen, Gritman, Snow, and Gysi, have worked on this subject, and have produced articulators which have become more and more complicated.

The last three investigators mentioned have recognized the fact that too complicated an articulator would not be used by most dentists, and after experimenting with very complicated instruments have placed simpler ones on the market, hoping to educate the dentists to the realization of the value of the anatomic method of articulation, with a prospect of their taking up the more scientific instruments.

Probably if more had been written regarding the practical manipulation of these instruments, instead of discussions of the mechanical principles involved, we should have made greater advance toward their general use.

SELECTION OF AN ARTICULATOR.

In selecting an articulator, the writer would advise first to favor a simple one having few movements, so as not to confuse the beginner. This simple articulator should have provision for the use of a face-bow, for an anatomic articulator which is used without the face-bow offers no advantages over the plain-line articulator.

THE FACE-BOW SUPPORT.

In using the face-bow some difficulty may be encountered in its adjustment to the condyles, but by the use of an instrument called the face-bow support (Fig. 1), which has been recently designed by Dr. F. H. Brown of Lebanon, N. H., this operation is greatly simplified. This appliance consists of a spectacle frame, the bows of which carry an adjustable target with a central hole. This hole is placed over the condyle and held in its position by means of a thumbscrew; then the hole is covered up by a small slide which bears a point on it designed to fit the markers of the face-bow, rendering it much easier to adjust the face-bow to these points, which represent the exact

position of the condyle, and eliminating guesswork. (Fig. 2.)

Attention is called to the fact that the face-bow does not help us in obtaining

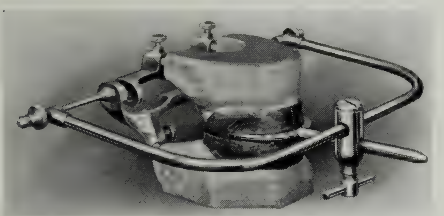
Fig. 1.

correct bites, which must be done before we attempt its use.

MOUNTING THE CASTS.

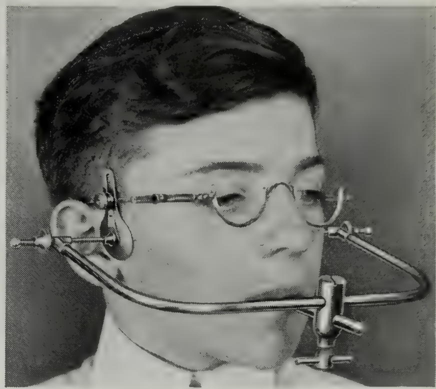
Objections may be raised that the use of this instrument complicates the taking of the bite to such a degree as to make

Fig. 3.



it unprofitable, in reply to which let us say that any dentist who spends more than five minutes in adjusting the face-bow is not only wasting his own time but that of his patient. Moreover, after the face-bow measurement is taken, the process of mounting the casts on the articulator is simple and certain. One of the reasons for the failure of many plates is the improper mounting of the casts on the articulator, and no doubt,

Fig. 2.



if in plain-line articulators some provision were made for the use of the face-bow, the percentage of successful plates would be higher.

The casts must be mounted on the articulator in correct relation to the condyles or hinges of the articulator; in other words, must bear the same relation to the condyles as the alveolar ridges in the mouth bear to the temporo-mandibular articulation. (Fig. 3.)

Fig. 4.

If the casts are not mounted in an anatomically correct manner we obtain the result shown in Fig. 4. When the anterior teeth are brought together to

incise food, the posterior teeth do not come in contact, and the plates are thrown out of position.

SETTING UP THE TEETH.

In setting up the teeth on an anatomic articulator, several points are to be ob-

FIG. 5.

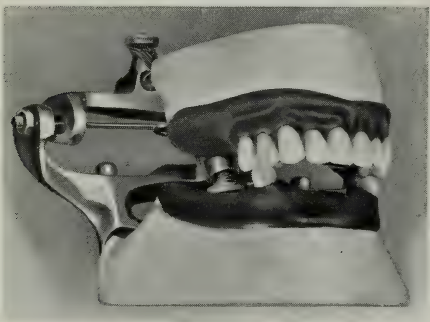


FIG. 6.

served. Let us consider a simple full upper and lower case to start with. We should set up the upper ten anterior teeth, from second bicuspid to second bicuspid. These are the essential teeth to start with, because upon them depends the fulness of the lips and the expression of the face. Any change which is made in these factors for esthetic purposes will necessitate a change in the occlusal curves. These occlusal or compensating curves seem to be the stumbling-block of most prosthetists who attempt to articulate a set of teeth on an anatomic articulator; but if no special attention is paid to them, it will be found that they work out of their own accord, without any knowledge on the prosthetist's part of geometry or trigonometry, which some writers would have us believe is necessary, judging from the complex diagrams which accompany their articles. After the upper ten anterior teeth are in place we should remove our lower bite plate, and place the lower second bicuspid in position. (Fig. 5.) The same on the opposite side. The result is tested by

FIG. 7.

pulling the upper jaw of the articulator backward, which is the same as moving the lower one forward, until the second bicuspid touches the upper first bicuspid. If both sides touch at the same time, then these teeth are in their correct positions. Then work forward, waxing-up the lower first bicuspids, then the lower canines, and lastly the lower lateral and central incisors in their proper positions.

Every time a tooth is placed in position, the upper part of the articulator is moved forward, and care is taken that the tooth placed last touches in this position as well as in the normal position of rest.

After the anterior teeth and bicuspids have been set up in the manner described, the lower first molars are placed in position on each side and tested; then the upper first molars are set up

and tested, followed by the lower and upper second molars in sequence.

In testing the teeth, care should be taken not to press the jaws of the articulator too hard, as the teeth in the soft wax will be moved out of place. The articulator should be held in testing as in Fig. 6, and in using the Gysi articulator the incisal guide bar should be grasped with thumb and forefinger of the hand which is not holding the articulator, and the upper part of the articulator moved by this bar (see Fig. 7).

If these directions are followed, it will be found that the compensating curves work out of their own accord, and after a few trials the dentist will be able to set up teeth by this method almost as quickly as with a plain-line articulator.

THE OSCILLATING CURVE AND GRINDING.

Nothing has been said about the oscillating or side-to-side motion as yet. This will take care of itself to a great extent if, when setting up the bicuspids and molars, we see to it that the lingual and buccal cusps of the upper and lower teeth touch each other. If this point is observed, a very small amount of grinding will have to be done when the plates are finished. Most of the necessary grinding consists in removing the points of the canines, the grinding to be done from the lingual side in the upper, and from the buccal side in the lower plate. Most of the dental supply houses have done away with this grinding in their new anatomical molds of teeth. The same principle is observed in grinding any of the anterior teeth.

If this method of grinding is followed out in some plates which do not give satisfaction, the patient usually is able to use the plates with much more comfort and efficiency.

By way of digression, it should be stated that much better results would be obtained in plate work if only one plate were vulcanized first and placed in the mouth together with the opposing plate modeled in wax, and the teeth in this wax plate were adjusted to the finished vulcanite plate.

SEQUENCE IN FINISHING PLATES AND CORRECTION OF MINOR ERRORS.

In making a full upper and lower denture, the upper should be finished first. In making a full upper and partial lower denture, the partial plate should be completed first. In making a partial upper and a partial lower denture, the one which carries the fewer number of teeth is made first. This method requires the patient to make one more visit to our office than was necessitated by the old method. But if any distortion of the plate has taken place in the vulcanizing process, or if the bite has been taken incorrectly, we have an opportunity to correct it at this time, thus saving ourselves the trouble of having to remake a plate several times. If, for instance, we should find a variation from the original bite—and we most always do—the plate which is finished and the one which is modeled in wax can be stuck together with a little yellow wax and remounted on the articulator, where the necessary changes are made. This is done while the patient waits. A little wet tissue paper is placed in the undercuts of the finished plate and attached to the articulator with impression plaster, which requires less time to set than casting plaster. Of course, if the bite is too far from being correct, the upper finished plate is used in conjunction with the lower bite plate, and a new bite obtained. It is not necessary to take the face-bow measurement again, as the lower cast is still mounted on the articulator in its correct anatomical position.

When the plates are finished, they are placed in the mouth, and it is ascertained from the patient whether they strike too hard on one side or the other. If this striking is hard enough to tip the plates, the point at fault is found by means of articulating paper, and high cusps are ground off. No great amount of grinding should be done in an attempt to obtain too perfect an articulation, because, if the plates should settle, as they most always do after having been worn for a week or two, it may appear that too much grinding has been done. This

is especially true in the frequent cases of full upper and partial lower dentures, the patient retaining the natural anterior teeth in the lower jaw. The many failures in this type of plates are due to the fact that the lower posterior teeth are set too low, allowing the anterior teeth to strike too hard and tilting the upper plate out of position. In fact, the upper anterior teeth should never touch the lower ones when the plates are in their normal position of rest.

FINAL ADJUSTMENT.

The patient should be instructed to return for a final adjustment of the teeth after he has worn the plates for about two weeks. Articulating papers should be placed on both sides of the mouth at the same time; the patient is told to move the jaws in the same way as if he were masticating food, and any teeth at fault are finally ground so that there is absolutely no tilting. If the patient is unable to tell which side strikes harder, the prosthetist, by placing the thumb and forefinger on each side of the upper plate while it is in the mouth, and the same fingers of the other hand on the lower plate, can easily ascertain where grinding is needed. Any good grade of double-sided carbon paper will answer for this purpose.

If it is found that, when the plates have settled, the curve of occlusion is not high enough, this curve can be increased slightly by grinding the lower bicuspids and upper molars, but not the upper bicuspid or lower molars. Subsequently, of course, the anterior teeth, both upper and lower, will require grinding, the upper ones on their lingual surfaces, the lower ones on their labial surfaces.

For the side-to-side motion, the buccal cusps of the lower molars and bicuspids and the lingual cusps of the upper corresponding teeth are ground.

CONCLUSION.

If the points enumerated are observed, very little trouble will be encountered in plate work. Each patient's individual peculiarities, of course, must be taken into consideration. If the dentist would use proper methods in articulating teeth and would devote as much study to his prosthetic cases as he devotes to the other specialties of dentistry, dental prosthesis would soon become a pleasure instead of a bugbear.

THE HIGHER VALENCY OF ARSENIC VERSUS THE TRIOXID IN THE DEVITALIZATION OF THE DENTAL PULP.

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OHIO COLLEGE OF DENTAL SURGERY.

(Read before the Cincinnati Dental Research Society, May 5, 1914.)

ALL chemical compounds may be conveniently divided into two large classes of substances, which we call respectively *electrolytes* and *non-electrolytes*. By electrolytes we mean all those substances which, when in solution, conduct the electric current, while non-electrolytes, mostly organic compounds, do not possess this property. To the class of electrolytes belong all the inorganic *acids, bases,* and *salts*. These three kinds of substances, being thus brought into one class by virtue of their common property of conducting the

electric current, must necessarily also contain the same common means or mechanism whereby they convey that current. These means must be of a chemical nature, because they exist prior to the passage of the current and are a prerequisite to the greater chemical reactions which take place in water solutions.

IONIZATION.

This prerequisite, or means, finds expression, fundamentally, in what is called "ionization," or "electrolytic dissociation," which may be explained as follows: When we dissolve a solid in water, two events may result—the substance may split up into its molecules only, or it may disintegrate or cleave still further, into its atoms or radicals. Ordinarily, all substances dissolve first as molecules, and of course as such they do not convey electricity. This seems to be the mode in which the organic compounds dissolve. Secondly, if further disintegration takes place, the dissociation now occurs between the atoms or radicals of the compound, and is precisely what we designate as ionization. The dissociation of a chemical compound into its atoms or radicals cannot be conceived as taking place into more than two components, which correspond to the *metal part* and the *acid part* of the chemical compound under consideration. Take for examples, Na/Cl, H/NO_3, $H/C_2H_3O_2$, K/SCN, Cu/SO_4, or $Cu(NH_3)_4/SO_4$, in which a division takes place between the metal or base and the non-metal or acid. This is also indicated by the chemical name of the substance in question.

These atoms or radicals into which a substance dissociates are called *ions,* from the Greek ἰών, which means "going," and the process of these ions going asunder in the solution is termed ionization. To characterize which ion is meant, the base or the acid, we prefix the Greek prepositions κατὰ and ἀνὰ calling the base the *cation* and the acid the *anion.* While we allow that the ions are the means of conveying electricity through the electrolyte, we must still insist—*Why* and *how* do they conduct the current?

For the current to pass through the ionic solution demands the condition that the ions themselves are electrically charged. This charging of the ions takes place simultaneously with the dissociation—the metals taking on positive charges, and the acids negative charges. We may indicate this as follows:

$$NaCl \rightarrow \overset{+}{Na} + \overset{-}{Cl}$$
$$AsCl_3 \rightarrow \overset{+++}{As} + 3\overset{-}{Cl}$$
$$\text{and } H_2SO_4 \rightarrow 2\overset{+}{H} + \overset{=}{SO_4}$$

Instead, however, of writing the + and — signs over the respective ions, it is customary to place a dot ($^{\cdot}$) for the cation and a dash (′) for the anion, thus:

$$As^{\cdot\cdot\cdot}\,Cl_3{}'$$

Note that these charges go parallel with the valencies of the respective ions. You may ask, Whence are these electrical charges derived? We answer: Ionization, as intimated above, is a chemical process, since upon evaporation of the solution the ions give up their charges and pass back into their molecular combination, and finally into the solid state of the substance from which they were derived. The ionic state of a substance represents a certain allotropic form or higher energy content, as chemical action in water solution is always more prompt, and on this account must be a chemical rather than a physical condition. We may thus represent, first, elementary arsenic as As°, with a certain amount of energy content; then as arsenic in arsin (AsH_3), in the molecular state, with a different amount of energy content; and lastly, as $As^{\cdot\cdot\cdot}$, in the ionic state, with a still greater energy content—because in this condition it is chemically most active. Accepting this as the state of affairs, we can readily understand *how* the current flows through the electrolyte. The positive and negative charges already present in the electrolyte simply neutralize with the charges of the electrodes. This neu-

tralization at the electrode surfaces necessitates the movements of the ions carrying their charges, the positive ions moving toward the cathode and the negatively charged ions going to the anode. As the current in the wire can be considered as passing by conduction, so within the electrolyte it may be regarded as being carried forward by convection. The majority of ions are colorless and their presence must be determined by certain circumstances, while a few, both elementary and complex, reveal their presence by their characteristic color. I have here [exhibiting] several solutions of the more important ones to show you: Nickel ($Ni^{\cdot\cdot}$), green. Cobalt ($Co^{\cdot\cdot}$), pink. Copper ($Cu^{\cdot\cdot}$), blue. Chromium ($Cr^{\cdot\cdot\cdot}$), violet. Permanganate (MnO_4'), purple. Copper-ammonia ($Cu(NH_3)_4^{\cdot\cdot}$), a characteristic blue. Dichromate (Cr_2O_7''), orange. Phenolphthalein ($C_{14}H_9O_4'$), red. The degree of ionization goes parallel with the dilution. In a unit concentration—*e.g.* a gram molecule of the substance dissolved in one liter of water—every electrolyte possesses a definite degree of ionization. The solutions shown are of deci-normal concentration. Hydrochloric acid, for instance, in deci-normal solution is ionized to the extent of 90 per cent., while acetic acid of the same concentration is ionized only 1.3 per cent. We will now demonstrate a few cases of ionization.

Experiment 1. Here is a molecular solution (not ionized) of cobalt chlorid ($CoCl_2$). Note its color. By dilution ionization should take place. That is what really happens, as is evidenced by the production of cobalt ion, a pink color.

Experiment 2. I have here a molecular solution of ammonium hydroxid (NH_4OH) dissolved in ethyl alcohol, which is an ionic solvent of the fourth order (water, formic acid, and methyl alcohol being electrolytic solvents which have value in the order named). To this solution is added a little phenolphthalein ($HC_{14}H_9O_4$). Now, with the addition of water NH_4OH becomes ionized into ammonion ($NH_4^{\cdot}$) and hydroxidion (OH'). The hydroxidion neutralizes the hydrion ($H^{\cdot}$) of phenolphthalein, forming water and the red negative ion $C_{14}H_9O_4'$. The formation of this red ion goes parallel with ionization of the NH_4OH, which increases with the dilution.

Experiment 3. Perhaps the most interesting substance in which we can watch the progress of ionization is copper bromid ($CuBr_2$). In the solid form copper bromid is a jet-black, shining crystalline substance. When treated with sufficient water to dissolve it, the solution acquires a deep reddish brown tint—this, no doubt, is the color of the molecules. When more water is added, the deep brown gradually becomes green, and finally blue, the characteristic color of copper ions. The bromin ion is colorless and does not interfere with the color reaction of the cuprion. When copper bromid is dissolved in its own weight of water, independent measurement shows very little ionization. When ten times its weight of water has been added, 70 per cent. of the salt is ionized. With 40 times the amount of water the blue stage is reached and the salt is ionized about 81 per cent. At 70 per cent. of ionization we can again repress the ionization by adding potassium bromid (KBr). The bromin ions in this case will overbear the cuprions, according to the following formula:

$$\frac{[Cu^{\cdot\cdot}] \times [Br']^2}{[CuBr_2]} = K$$

Experiment 4. We will now demonstrate the progress of ionization by means of the electric current. We will again use copper bromid in order to show the parallelism between the color changes and the readings of the ammeter. My assistant will read off the indications of this instrument as I add the solvent, which is simply distilled water, which does absolutely not conduct electricity. This parallelism, as you see, is conclusive. My assistant will evaporate this copper solution and recover the copper bromid in the solid state, which you can inspect after the lecture.

The degree of ionization is very im-

portant in chemical reactions. In the following experiment we want to show the difference in action of a highly ionized acid and one that is feebly ionized.

Experiment 5. We have here two samples of potassium permanganate of the same quantity and concentration ($\frac{1}{2}$ per cent.) which we will reduce by the action of potassium bromid. The addition of an acid in this case is necessary. We will add to one portion, sulfuric acid which is ionized 51 per cent. for a normal solution. To the second portion of $KMnO_4$ we add the same amount (10 cc.) and concentration of acetic acid. Now, adding the bromid to both portions, you note the reaction. Since normal acetic acid is ionized only 0.004 per cent., considerable extra time is required to effect the reduction of potassium permanganate.

Experiment 6. Let us now make the first usual analytical test of an arsenic compound. If such a compound be treated with hydrochloric acid the arsenic will be transposed and become the cation if it should not already occupy that position. By passing hydrogen sulfid gas (H_2S) into the solution we obtain a yellow precipitate of arsenic trisulfid, As_2S_3. Thus:

$$2AsCl_3 + 3H_2S = \underline{As_2S_3} + 6HCl$$

As_2S_3 is underlined to indicate the precipitate. If we write this equation indicating the ions, we have

$$2As^{\cdot\cdot\cdot} + 6Cl' + 6H^{\cdot} + 3S'' = \underline{As_2S_3} + 6H^{\cdot} + 6Cl'$$

We may cancel the ions common on both sides of the equation, and we obtain

$$2As^{\cdot\cdot\cdot} + 3S'' \rightarrow \underline{As_2S_3}$$

This is known as the ionic equation. It is the most universal expression of a chemical reaction that we can write. The above expression tells us that any two arsenic cations plus any three sulfur anions will give arsenic trisulfid.

Experiment 7. Let us prove this. We will take ammonium sulfid, $(NH_4)_2S$, instead of hydrogen sulfid. Writing the equation and striking out the common ions, we have

$$2As^{\cdot\cdot\cdot} + 3S'' \rightarrow \underline{As_2S_3}$$

You see the result is the same.

The above reaction is one of double decomposition or metathesis. The metal of one substance has exchanged for the acid of the other reacting substance, and equations for such reactions are easily written if we keep in mind the electric charges of the ions.

If we dissolve arsenic trioxid in water we first obtain arsenious acid, according to the following reaction:

$$As_2O_3 + 3H_2O \rightarrow 2As(OH)_3$$

The arsenous acid at once ionizes according to one or both of two schemes:

$$(1)\ As(OH)_3 \rightarrow AsO_3''' + 3H^{\cdot}$$
$$(2)\ As(OH)_3 \rightarrow As^{\cdot\cdot\cdot} + 3(HO)'$$

You know the presence of hydrion ($H^{\cdot}$) indicates an acid and hydroxidion $(OH)'$ a base. Accordingly, As_2O_3 ionizes as an acid and as a base. We have a few substances in chemistry, as tin and aluminum, which ionize in this manner and are therefore called *amphoteric,* or capable of two different reactions. What does this mean to us? If we add an hydroxid to the first of the above expressions, we neutralize the hydrion with the formation of water, thereby allowing the arsenious acid radical to predominate. If, however, we desire to favor the ionization of arsenic cation ($As^{\cdot\cdot\cdot}$) we add an acid to neutralize the hydroxidion. This is precisely what we did when we precipitated As_2S_3. So that by simply varying certain conditions we can promote the ionization of As_2O_3 in either direction. Now, which of these two ions, $As^{\cdot\cdot\cdot}$ or AsO_3''', devitalizes the dental pulp? We will leave this an open question for the present and take up the consideration of oxidation and reduction.

OXIDATION AND REDUCTION.

To facilitate our approach to this important study, I here give a few equations with a view to obtaining a compre-

hensive definition of oxidation and reduction:

$$
\begin{array}{ll}
(1) & Cu + O \rightarrow CuO \\
(2) & Zn + CuSO_4 \rightarrow ZnSO_4 + Cu \\
(3) & H_2S + O \rightarrow H_2O + S \\
(4) & CuO + 2H \rightarrow H_2O + Cu \\
(5) & 2HgCl + SnCl_2 \rightarrow SnCl_4 + Hg^\circ \\
(6) & Cl^\circ + HI \rightarrow HCl + I^\circ
\end{array}
$$

In equation (1) Cu is oxidized because it gains oxygen. (2) Zinc is oxidized because it gained a non-metal (SO_4). (3) Sulfur is oxidized because it lost hydrogen (H). (4) Copper is reduced because it lost oxygen. (5) Mercury is reduced because it lost a non-metal (Cl). (6) Chlorin is reduced because it gained hydrogen.

From the consideration of the above equations we may state briefly that oxidation consists in the gain of oxygen or any non-metal, and in the loss of hydrogen; while reduction is the exact opposite of this, namely, a loss of oxygen or any non-metal, and a gain of hydrogen. Supposing we write some of the above equations in the ionic form, say equations (2), (5), and (6):

$$
\begin{array}{l}
Zn + Cu^{\cdot\cdot} \rightarrow Zn^{\cdot\cdot} + Cu \\
2Hg^{\cdot} + Sn^{\cdot\cdot} \rightarrow Sn^{\cdot\cdot\cdot\cdot} + 2Hg \\
Cl + I' \rightarrow Cl' + I
\end{array}
$$

We note that all those substances which were oxidized acquired additional positive charges or lost the negative charges, while all those which were reduced lost positive charges or gained negative charges. Since these electric charges stand for valencies of the ions, we may state: Oxidation is a gain of positive valency or a loss of negative valency; while reduction, the opposite of oxidation, is a loss of positive and a gain of negative valency. Referring to our equations again, we learn another important lesson, namely, that when one substance is oxidized another substance is reduced, so that the terms oxidation and reduction are not referable to the reaction, but to the substances participating in the reaction. We can say, for instance, that $SnCl_2$ is oxidized and HgCl is reduced, but we can never say that the reaction is one of oxidation or reduction. We grasp this subject of oxidation and reduction thoroughly when we understand that it consists essentially in a transfer of ionic charges or valency from one substance to another. Keeping this transfer of valency in mind, we have no difficulty in writing the most complicated chemical equations, as we shall presently see.

Experiment 8. Let us first take a familiar example, namely, the reduction of potassium permanganate ($KMnO_4$) by hydrogen dioxid (H_2O_2); this, on account of the color changes, is quite conclusive. Permanganate ion has a deep purple color. We add a small amount of acid for a purpose which I will point out directly. Now, adding H_2O_2 or any other reducing agent, the color of the permanganate disappears. Elementary oxygen escapes, which we demonstrate by re-igniting a glowing match.

Let us write the equation for this reaction:

$$
\overset{5}{K}MnO_4 + \overset{2}{H_2}O_2 + H_2SO_4 \rightarrow MnSO_4 + K_2SO_4 + H_2O + O
$$

Before attempting to balance this equation let us determine the valencies of the respective substances before and after the reaction. What is the valency of manganese (Mn) in potassium permanganate ($KMnO_4$)? I will give two methods of determining this. First, the algebraic sum of the charges of the ions is equal to zero. Thus the valency of potassium in $KMnO_4$ is plus 1 ($+1$). The valency of the oxygen being always -2 and being in this case taken four times, is -8. Consequently the valency of manganese must be plus 7 ($+7$), since

$$
+1 + (-8 + 7) = 0 \left(\underset{KMnO_4}{+7 + 7 - 8 = 0} \right)
$$

Secondly, according to Prof. Boettger of Leipzig, we proceed as follows: Write the symbol of the element whose valency we are seeking. Of course the valency of the other element or elements must be known—generally oxygen with a valency of -2, or sulfur, also with a va-

lency of —2, or hydrogen with a valency of +1. Then multiply the valency of the known element, with the proper sign, by the number of atoms of that element. Make this expression equal to the valency of the ion with its proper sign. Then solve the equation. Should the element of which we are determining the valency appear with more than one atom, divide the result by the number of these atoms. Example: To find the valency of—

$$\begin{aligned}
&\text{Mn in } MnO_4': \quad Mn - 2 \times 4 = -1;\ Mn = -1 + 8 = +7\\
&\text{S in } SO_4'': \begin{cases} S - 2 \times 4 = -2 \\ S = -2 + 8 = +6 \end{cases}\\
&\text{Cr in } Cr_2O_7'': \begin{cases} Cr - 2 \times 7 = -2 \\ Cr = -2 + 14 = +12 \quad 12 \div 2 = +6 \end{cases}\\
&\text{N in } NH_4^{\cdot}: \begin{cases} N + 1 \times 4 = +1 \\ N = +1 - 4 = -3 \end{cases}
\end{aligned}$$

We see then that the valency of manganese in potassium permanganate is +7. In manganic sulfate ($MnSo_4$) it is +2. In the transfer, manganese lost five charges or points of valency; mark "5" over $KMnO_4$ in the equation. Hydrogen dioxid, H_2O_2, becoming water, H_2O, lost two negative valencies, which is equivalent to gaining two positive charges—and which, as we have seen, means oxidation. Write "2" over H_2O_2. Potassium permanganate ($KMnO_4$), then, lost five points, and hydrogen dioxid acquired two. If now we write these two numbers inversely as factors of the respective substances, we obtain the molecular factors of our equation, and the balancing of the equation is assured. The acid in this equation is added in order to supply the negative ions to go with the metals potassium and manganese. The equation completed is as follows:

$$2K^{\cdot}MnO_4' + 5H_2O_2 + 3H_2{}^{\cdot}SO_4''$$
$$\rightarrow 2Mn^{\cdot\cdot}SO_4'' + K_2SO_4 + 8H_2O + 10O$$

With these preliminary remarks we can take up the oxidation and reduction of arsenic. Let us take our precipitate arsenic trisulfid (As_2S_3).

Experiment 9. Upon adding nitric acid (HNO_3) the arsenic trisulfid goes into solution, and if we were to analyze the products of the reaction we should find arsenic acid, sulfuric acid and nitric oxid. Let us write the formulæ of the substances in the reaction:

$$\overset{28}{As_2S_3} + \overset{3}{HNO_3} \rightarrow H_3AsO_4 + H_2SO_4 + NO$$

Before completing this equation let us determine the individual valencies. What is the valency of As in As_2S_3? The valency of As in As_2S_3 is 3, according to the rule that the algebraic sum of the + and — sign = 0. The valency of As in H_3AsO_4''' is most easily determined according to Boettger's rule:

$$As - 2 \times 4 = -3$$
$$As = -3 + 8 = +5$$

Thus, +5 is the valency.

The valency of—

S in As_2S_3 is —2
N in HNO_3 ($N - 2 \times 3 = -1 = +5$) is 5
N in NO is + 2, since O is —2
S in H_2SO_4 ($S - 2 \times 4 = -2,\ S = -2 + 8 = +6$) is 6

We note that one atom of As gains 2 charges, and for the two atoms of As in the As_2S_3 there must be an increase of 4 positive charges. What about the sulfur? S changes from — 2 in As_2S_3 to + 6 in H_2SO_4. Therefore a gain of 8 points, and for three atoms of S ($3 \times 8 = 24$) a gain of 24 points. We have, then, for one molecule of As_2S_3 a gain (4 + 24) of 28 positive valencies. Let us mark this number over As_2S_3 in our equation. N in HNO_3 going to NO loses 3 points. Place this number over HNO_3. Taking these numbers inversely, *i.e.* placing 3 before As_2S_3 and 28 before HNO_3, we obtain the molecular factors of our equation and from these two numbers we balance the entire equation. The

addition of water supplies the remaining necessary hydrogen and oxygen:

$$3As_2S_3 + 28HNO_3 + 4H_2O \rightarrow 6H_3AsO_4 + 9H_2SO_4 + 28NO$$

Without reckoning with this exchange of valencies, how long would it have taken us to find these two factors, 3 and 28? Indeed, dealing with the valencies in a reaction of this kind, we really touch upon the essence of oxidation and reduction.

I left it an open question a little while ago which form of arsenic, whether as cation or as anion, devitalized the dental pulp. We know that elementary arsenic does not do it. In the trioxid, which we generally use in our practice, arsenic exists as an anion, and we may safely state that the latter form is concerned. We have two such anions or acid ions of arsenic, namely, AsO_3''' and AsO_4'''. Of course, the oxygen of these ions may be replaced by sulfur without altering their valency value. I will enumerate the analytical tests for these two ions. Silver nitrate ($AgNo_3$) with an arsenite gives a yellow precipitate which is silver arsenite (Ag_3AsO_3), and with an arsenate it throws down silver arsenate (Ag_3AsO_4). This reagent then is used for both arsenic ions. Treating an arsenite with $CuSo_4$ a green precipitate is thrown down which is known as Sheele's green. A characteristic reagent for an arsenate is magnesia mixture, giving $MgNH_4AsO_4$, a white precipitate.

The arsenite ion can be oxidized to the arsenate ion, and *vice versa* the arsenate ion can be reduced to the arsenite by a number of substances, which are then affected in the opposite sense.

Experiment 10. An oxidizing agent which appeals to us on account of the color changes is Fehling's solution. The reduction of copper sulfate ($CuSO_4$) to cuprous oxid (Cu_2O), which is of a yellow tint, shows that some other substance—in our case the arsenite ion—was oxidized, according to the following schemes:

$$2Cu^{\cdot\cdot} + As^{\cdot\cdot\cdot} \rightarrow 2Cu^{\cdot} + As^{\cdot\cdot\cdot\cdot\cdot}$$
$$2Cu^{\cdot} + 2OH' \rightarrow Cu_2O + H_2O$$

Experiment 11. I want to show an interesting reducing agent to effect just the opposite of Fehling's, namely, to reduce the arsenic pentad to the triad, which also appeals to the eye. This is potassium iodid (KI), which on being oxidized leaves free iodin, which is visible to the eye. The reaction may be represented thus:

$$As^{\cdot\cdot\cdot\cdot\cdot} + 2I' \rightarrow As^{\cdot\cdot\cdot} + I_2$$

PHARMACOLOGY.

While so much could still be said on oxidation and reduction, I must refrain from any further discussion of it and endeavor to make clear to you my specific application of the principle so far discussed to our subject at hand—namely, How does the higher valency of arsenic affect organic matter, and eventually nerve tissue?

Experiment 12. I have here some albumin. We desire to establish the fact whether or not it will reduce the higher valency of arsenic to its lower valency. If it does we have evidence that albumin was oxidized or dehydrated, which is tantamount to oxidation, as we saw—a loss of hydrogen being oxidation. To the albumin we add arsenic pentoxid or any arsenate, say sodium arsenate. As considerable time is required for this process, I prepared this mixture yesterday; it is sodium arsenate and albumin. We will now make the analytical test for arsenite. Adding $AgNO_3$ we get a yellow precipitate, which is proof for the arsenite ion.

Since a slight trace of arsenate, which escaped reduction by the albumin, also reacts with silver nitrate, we must conform our conclusions, to some extent, to the degree of color changes in the precipitate. Knowing that a large proportion of yellow is required to effect color changes with the red precipitate of the arsenate, it can readily be seen that the bulk of our arsenate has been very nearly reduced. Professor Boettger recommends Fehling's solution (mentioned under experiment 10) when we have a mixture of arsenate and arsenite ions, the reduc-

tion of cupric ions being effected by the arsenite alone.

You note that the experiment substantiates our inquiry. Organic matter —I should not make this so broad; rather, albumin—can reduce pentavalent arsenic and thereby lose its identity chemically. From this we may infer that arsenic pentoxid or any soluble arsenate will destroy pulp tissue by oxidation. If this be true, the pharmacology of the higher valency of arsenic is *ipso facto* established; but laboratory investigations never give us full assurance of the behavior of any drug on live tissue. In the living economy, though it employs the same physical means as prevail in the laboratory, yet we find additional factors, such as vital resistance, absorption, assimilation, etc., which we only feign to compass. Here we cannot establish equilibrium, whether stable or unstable, between any phase of vitality, which is motion from within, the characteristic essential of life. Biology is determined objectively by the operations and processes of life as they are revealed to our senses. In short, biology regards life as effect, not as cause. It takes cognizance of what life does, but not of what life is. Hence it is owing to our deficiency of knowledge in the purposes and elaborations of life that we so often err in our efforts to theorize about them. But we want science, nevertheless; we can know what drugs do, and the therapeutic results which follow their employment, whether this be rational or only empirical. We recognize the effects of the anesthetics of the methane series, but we theorize when we say that these substances are soluble in the lipoids, which are especially abundant in the ganglions of the nerve centers, and that anesthesia is a result of the absorption of the anesthetic by these ganglions. From the effects produced by the various drugs we succeed quite well in classifying our remedial agents, and with regard to their pharmacological action we build largely on hypothesis, save for the grosser chemical and physical manifestations. We know what caustics are, namely, substances or agents which destroy tissue. Some of these caustics we say coagulate albumin, like phenol or silver nitrate; others do not coagulate albumin but destructively dissolve it, like the alkalis, to the penetration of which there is no limiting coagulum. Arsenic trioxid, we say, does not coagulate albumin, nor can we say that it dissolves it like an alkali. Hence, it is said, arsenic trioxid stands in a class by itself.

With regard to the physiological action of arsenic trioxid we have a host of theories. Probably the first theory was advanced by Adolph Witzel, in 1885; he states that arsenic trioxid acts on the diseased parts of the pulp, only causing increased circulation in the healthy parts, without penetrating into the entire pulp or through the apical foramen. According to Arkövy, hyperemia of the pulp is the first result under arsenic trioxid treatment, and is followed by thrombosis and embolism of the capillaries. The arsenic combines with the hemoglobin of the blood, causing anemic collapse and shrinkage. The connective tissue cells become greatly enlarged, while the connective tissue fibers remain unchanged. The axis cylinders of the nerve cells disappear, while the cells themselves show a granular débris within the myelin. Hermann Prinz sums up the specific action of arsenic trioxid on the tooth pulp in the following words: "The endothelial coat of the capillaries is quickly corroded, causing multiple hemorrhage. Destruction of the blood plates immediately follows, resulting in granular detritus; thrombosis and stasis are the direct sequences. The connective tissue fibers and the odontoblasts are but little altered. The primary point of attack on the nerve centers is located in their endings, causing a destruction of the myelin and a more or less pronounced neuritis; the latter is usually followed by complete cessation of all pain. The pronounced disturbances of nutrition finally result in anemic collapse and shrinkage of the entire pulp mass. Strangulation of the pulp about

its apical end, resulting from the action of arsenic, is not the direct cause of its death; in teeth with undeveloped roots or in those with partially absorbed roots, strangulation is very doubtful."

No account of the pharmacology of arsenic would be complete in which the names of Binz and Schulz were omitted. These two investigators advanced the theory that arsenious acid becomes oxidized to arsenic acid by the oxidizing power of live tissue, and immediately after this the reverse order sets in, namely, that the higher valency of the arsenic acid becomes reduced to the lower form or valency by the reducing action of the tissue. In this way oxygen is alternately withdrawn and supplied to the protoplasm. This oscillation of oxidation and reduction, they claim, is the essential feature of the destructive action of arsenic.

My own theory of the pharmacological action of arsenic agrees partly with this view—in as far, namely, as the arsenic acid is reduced to arsenious acid by the reduction power of the tissue, which in turn is oxidized, thereby losing its identity. This view would be simpler, not necessitating two diametrically opposed powers inherent in the same tissue. If oxidizing power be ascribed to live tissue, why does this latter not oxidize mercurous chlorid, calomel, to mercuric chlorid, which is corrosive sublimate. The parity should hold. It might be objected, however, Why is arsenious acid so much more poisonous than arsenic acid? I would meet the objection by this interrogation: Why is corrosive sublimate so much more poisonous than calomel? We do not know. It would appear justifiable, however, to state that arsenious acid probably effects its toxicity in some other way than the arsenic acid, which initiates the more gradual process of oxidation—as is manifest by less severity of pain, if any, in its application.

What the future may have in store for arsenic pentoxid or any soluble arsenate rests with you, ladies and gentlemen of our worthy profession. I would kindly ask you to test its merits in your professional work in devitalizing pulps. Personally I can report good results.

THERAPEUTICS.

The therapeutics of arsenic for us dentists is the simple one of devitalizing pulp tissue, and the application of arsenic pentoxid is essentially the same as that of the trioxid, except that you may—I would advise it—double the dosage, since the pentad arsenic is about one-half as toxic as the triad. With regard to the arsenate, particularly sodium arsenate, which is extremely soluble, I would advise you to employ a saturated solution. A pledget of cotton soaked with this solution may be applied under a cement filling, which must be inserted without pressure; or the gutta-percha arsenic cup, which can be had at the dental depots, may be advantageously used in this connection. Of course, the sodium arsenate may be used in paste form like the oxid. The best vehicle for arsenic pentoxid is glycerin, as every other paste would deteriorate from the oxidizing property of this arsenic. Add the powder to a small quantity of glycerin until a suitable paste is obtained; should the preparation become rather fluid, add powder from time to time.

About three years ago I conceived the idea of testing the pentad arsenic in the devitalization of the pulp, and asked my druggist to procure a sample of the drug. As he could not obtain it in Cincinnati, I prepared it for myself. An aching tooth in my own mouth at the time needed to be treated, and I asked Dr. Siegel to apply this preparation in my case. From former experience of pain I had suffered from the trioxid I considered myself in a fair position to judge of the result. We allowed the treatment to remain in the tooth one week. I assure you I felt no effects—indeed, I supposed no action had taken place; on opening the tooth, however, we found the pulp entirely devitalized. After this I applied arsenic pentoxid in my own practice with very pleasing results. No pain was ever reported. I

found I could apply it on highly inflamed pulps, even relieving my patients of their suffering before they left the chair. Another advantage I found is that one can allow the arsenic to remain in a tooth indefinitely without bad consequences. I applied it in a patient's tooth and removed it again after her sojourn in Europe for three months. I remember two cases—one an upper first molar, another a lower first molar—where I applied the pentoxid three years ago, and the treatment has not yet been removed, the teeth having given no trouble in the interim.

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HEREDITY AS A FACTOR IN CONGENITAL HARE-LIP AND CLEFT PALATE.

By MR. WILLIAM F. BLADES, Cold Spring Harbor, Long Island, N. Y.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, at its annual meeting, New York City, April 23–25, 1914.)

YOUR kindness in asking me to address this convention of specialists in orthodontia is much appreciated, especially because it may be an opportunity to provoke among your members a discussion which I hope will be of great value to me in continuing the investigation of the problem of which I am here to speak. This is my excuse for presenting to you a paper which, instead of setting forth the conclusions of the study, seeks rather to call attention to the problem involved, how it is being attacked, and wherein each of you and the other members of your profession may be of great assistance in bringing it to a useful conclusion.

For the past few years, in collaboration with Dr. C. B. Davenport of the Eugenics Record Office, to whom I am indebted for the opportunity of devoting much of my time to this work, I have been engaged in a study of the influence of heredity in cases of congenital hare-lip and cleft palate. These two defects have been considered together because, as you are aware, they are merely two different expressions of a lack of closure of adjoining pairs of oral processes in early embryonic life, and because we find them so commonly associated in the individual and in the family.

FREQUENCY OF HARE-LIP AND CLEFT PALATE.

Hare-lip is an affliction which has occurred in the human race for a long time, to say the least. As early as the second century Galen knew it to occur among his people, and described it as *lagocheilos,* meaning a "lip like a hare." Galen gave us no information as to the frequency of this defect among the people of his time, but in our own population it is much more common than the casual observer would suspect. Very large, indeed, is the proportion of af-

fected individuals who die in early infancy from lack of the necessary nutrition, which is cut off by the inability of the mouth to function properly in sucking. Many who are so afflicted at birth do survive, however, and the defect is found among all classes of people.

It has long been recognized that a large number of these cases occur in members of certain families, in which this defect appears with much greater frequency than in the general population. There is a bulky literature about the methods of relieving the inconvenience of this defect by surgery or mechanical appliances, but no one has as yet satisfactorily explained the origin of the defect—and given the reason why the lip or palate normally undergo union in the developing embryo, while occasionally such union fails, and, when the child is born, the parts remain ununited, which condition we call a case of hare-lip and cleft palate. Of course, the greater mystery is why these parts ever grow together and form the kind of lip and palate which we call normal.

As a problem for study, the etiology of congenital hare-lip and cleft palate is very promising, not only because the trait is a very clear-cut one, which leaves little doubt as to its presence in the affected individual and can be studied in other animals as well as man, but also because it is a fatal defect in so many infants, and because in those who survive, it results in speech defect, disfigurement of the face, and peculiar embarrassment and mental anguish to the afflicted individual. The distortion in speech and unusual sensitiveness of an affected child sometimes retards his mental development in school.

POSSIBLE CAUSES OF ARREST OF DEVELOPMENT.

To William Harvey we are probably indebted for the discovery of the fact that hare-lip and cleft palate is an arrest of development. He pointed out that in the early stage of this development, every human embryo has both double hare-lip and cleft palate. At about the tenth or twelfth week, it is estimated, the processes which have been growing toward each other from the sides fuse to form the palate and the upper lip; but when growth has not continued until union of these parts takes place, the child is born with hare-lip or cleft palate, or both.

Let us examine, then, some of the factors which have been mentioned as possible causes of this arrest of development. It is not necessary to delay long over the "explanation" most commonly given, *i.e.* that this phenomenon is a "freak of nature," just a matter of chance, one embryo developing normally, while another remains in the undeveloped state. It is just such mysteries as this which science seeks to unravel.

Another explanation—and this is the commonest among the laity, and, curiously enough, still unchallenged by a professional man here and there—is that known as "marking," or the influence of maternal impressions. In many cases, where I have talked with the parent of an affected child, and in many more cases where some member of an affected family has written answers to my list of questions, I have noted the time when the maternal impression is supposed to have occurred. Very commonly, the time given is at a point in the latter part of the pregnancy, though embryologists agree that, if these closures are ever to be effected by nature, the union is complete by the end of the third month of fetal life.

TOXINS.

The proposition that the disturbance caused by the presence in the parent of some drug or poison such as, for instance, alcohol or the toxins of syphilis, may distort the development of the embryo, has been kept in mind in our investigation, but such an explanation of our cases seems impossible. We would urge, however, that anyone who has an opportunity to gather data of this character should by all means record anything which may be known, whether positive or negative.

In my experiments with dogs, it is clear that alcohol and syphilis are eliminated, nevertheless I obtain a great many puppies with both hare-lip and cleft palate.

NUTRITION.

The explanation that hare-lip and cleft palate may be the result of a disturbance in the nutrition of the embryo needs a great deal of consideration. That the nutritional factor is a *contributory* influence seems entirely conceivable, although this has never been demonstrated, but as a complete explanation of this particular defect it seems inadequate. If any weight can be attached to the general good health and apparent physiological condition of the parents, our data obtained in man as well as those obtained in dogs would in no measure support the malnutrition hypothesis. Hare-lip and cleft palate puppies are born of the healthiest dogs as frequently as of poorly nourished ones, when all are receiving the same food.

Frequent reference has been made to the cleft-palate cubs in the London zoölogical gardens, which are born of parents which had been fed boneless meat. Nevertheless, when a pair of my dogs were kept lavishly supplied with fresh bones, and their other food was liberally sprinkled with ground bones and lime-water, they had affected puppies as before. The lack of bone-making material of any sort could scarcely be held responsible for the lack of development of the soft parts of the palate, which close before ossification sets in, and it must be remembered that there is no bone in the lip, either normal or cleft.

It seems reasonable, however, to suppose that if nutrition could be shut off, the growth of the embryo would be checked, and that if this cessation of nutrition occurred at just the right point of time in the development of the embryo, it would result in hare-lip and cleft palate, instead of some other lack of development which might have taken place had the disturbance in nutrition come at some other period.

Right here I wish to propound a hypothetical question, which I hope will be considered in the discussion of this paper. To me at present this question seems important, and I am anxious for other opinions. At the same time when the lip and palate are closing, are not other parts of the embryo also developing? and if nutritional disturbance takes place at that time and arrests the development of the lip and palate, will not these other developing parts be arrested and at the birth of the child result in some other defects, the same defects usually if not invariably accompanying the hare-lip and cleft palate?

I will not attempt to answer the question myself, but I will state that our data do not show any such series of traits associated with hare-lip and cleft palate, and our cases do not show any apparent physiological condition of the mother which might be supposed to cause malnutrition of the embryo.

PRESSURE.

Dr. Truman W. Brophy of Chicago has set forth the hypothesis that pressure exerted against the upper jaw, by the knee of the embryo pressing against the lower jaw, spreading apart the ununited parts of the palate, may prevent their normal union. He argues this only as one factor, however, and recognizes heredity as a predisposing element. Someone else suggests that the rapid growth of the tongue may exert pressure to hold the palatal processes apart until the time for union is past.

These arguments regarding pressure, however, do not take the lip into account. Pressure can scarcely be considered as more than a possible contributory agent, which may in some instances act in conjunction with more potent influences, as Dr. Brophy seems to believe.

HEREDITY.

That heredity plays a part in the production of these defects has long been

recognized, but statements in regard to its influence have been based usually upon small fragments of a few family histories. The busy physician who delivers a hare-lip child, or the surgeon who operates to close the cleft or who makes a mechanical device to overcome some of its ill effects, has not the time or the inclination to delve into the family history further than to ask a question now and then of the parent. Such scraps of information as are thus obtained are sometimes valuable in themselves, always useful as the *basis* of a pedigree which must be carefully worked out, but, as they stand, are seldom adequate for conclusive statements as to the influence of heredity.

COLLECTING DATA.

The data which we are gathering on this subject are very different, in that we are pushing the inquiry farther into the family history by means of correspondence with and visits to many members of each affected family. Usually, when the case first comes to our attention, it is said by the physician or by the relatives that this particular case is the only one in the family.

If we are able to go to the region where the family in question lives, a few interviews with older members of the family or old residents of the village usually result in the discovery of forgotten cases of the same defect among the ancestors. Infant deaths among the relatives are inquired into, and thus often a case of cleft palate is uncovered which had been known to only two or three members of the family. Or it may happen that we are able to bring out some obscure or forgotten relationship with other cases which exist or have existed in the same community. These visits and questions do not involve any embarrassment to the family, and usually we find some member of the family who enters heartily into the spirit of the investigation and gives us very kind co-operation.

It is not always necessary or possible to go thus into the homes, because much can be done by correspondence with an interested member of the family. In fact, some of our most interesting pedigrees have been obtained in just this way. There are many families with whom I have been carrying on this kind of study for three years. Every few months I receive a letter from my correspondent telling of some new scrap of information discovered in talking with relatives, etc., and I reply with suggestions as to the strategic points in the pedigree for further investigation.

When a new case comes to our attention, the first thing we do is to obtain as much as possible of the family genealogy, and index on a series of cards all individuals in the family, affected or unaffected. These cards are then compared with an extensive index of cards made up from the hundreds of other family pedigrees which have already been filed. It frequently happens that by this means the family in question is found to be related to one or more of the families previously recorded.

The index is divided into four parts. In one of these divisions are listed alphabetically the names of all persons or families known to us who have hare-lip or cleft palate. The next division includes the same names, but they are arranged geographically instead of alphabetically. A third division includes the names of the unaffected ancestors of the hare-lip and cleft-palate cases above, and the fourth division contains the names of unaffected males who have married females of the affected families.

It often happens that there comes to us the name of an affected person long since dead, and of whom nothing further is known. This is welcome in our index, however, and often proves very useful. Sometimes the information is given us that in a certain town lives a family whose name is not remembered, but which is said to include several cases of hare-lip and cleft palate. This information is put into the geographical index, and when an opportunity can be found to visit that locality, search is made for such a family, and when it is found, the pedigree is obtained.

Parallel to the investigation of hare-lip and cleft palate in humans we are conducting a study of the same defect in dogs. This offers an excellent opportunity to mate, in various ways, both affected animals and unaffected ones of affected strains. Several generations have now been reared, many hare-lip offspring have been obtained, and there seems to be striking evidence of the influence of heredity.

CONCLUSIONS.

As to our conclusions, we are not yet ready to speak. To be sure, we may say that our data force us to the belief that heredity is at least one of the most important factors back of these defects, but our investigation seeks to go farther than this, and we wish to learn, if possible, what laws of heredity are involved. If this can be done, it is altogether likely that one can predict what marriages are likely to result in affected offspring, and what kind of marriage can be made by an affected person, or an unaffected person of an affected family, with reasonable certainty that the offspring will not have congenital hare-lip or cleft palate.

Our data are not yet sufficient to yield this important eugenic result, but there is a faith giving light ahead, and it is the faith fed by this light that has induced me to present this unfinished report, which is not intended to state conclusions, but to solicit your aid.

APPEAL FOR CO-OPERATION.

We need more cases, and everyone can be of assistance by sending in the names and addresses of affected persons or families, and adding any additional information which he may happen to have. In cases where the informant cares to give an introduction to the family, this courtesy will be greatly appreciated, but if one does not care to have the source of information known to the family, he will be carefully protected. Even in cases which, for some particular reason, the informant does not care to have us investigate, the names are important for our index, and we will not write to the family, if he forbids it. By sending us these cases, we believe you will be of very great service, not only to us but as well to the families in which this defect has appeared, and we shall thank you sincerely for your co-operation.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE DIAGNOSIS OF MALIGNANT DISEASES OF THE MOUTH.

By W. J. ROE, M.D., D.D.S., Philadelphia, Pa.

(Read before the Susquehanna Dental Association of Pennsylvania, at its annual meeting, Delaware Water Gap, May 26, 1914.)

MALIGNANT is a term applied to diseases which increase in intensity with rapidity or which proceed to a fatal end. There are, however, varying degrees of malignancy. The terms *low, average,* and *high* malignancy are used to designate the degree of rapidity of increase in intensity. Although the majority of cases correspond to the average type, cases of both high and low malignancy and occasionally of an extreme type are not infrequently seen. All proceed to a fatal termination. Only two diseases of the mouth in medicine and surgery answer to the term "malignant," these being carci-

noma and sarcoma, the malignant neoplasms or tumors, the diagnosis or recognition of which is dependent upon the operator's familiarity with their clinical and pathological phenomena. The conception clinically of a disease increasing in intensity with any degree of rapidity to a fatal end will establish the diagnosis of malignancy, and the application of the pathological anatomy in the same will clinch the differential diagnosis between carcinoma or sarcoma.

There are other diseases of the mouth that in a percentage of cases become malignant in type, but not invariably so, and they are, therefore, not malignant diseases. Among these are cancrum oris, carbuncle, glanders or farcy, malignant pustule or anthrax, diphtheria, cases of virulent and rapidly spreading infections, actinomycosis, syphilis, tuberculosis, tetanus, rabies, and scorbutus or scurvy.

CARCINOMA AND SARCOMA.

Although the histological diagnosis is the only accepted one in surgery for statistics, owing to the many mistakes that would otherwise occur, it is not always dependable. The microscopist may through delay or faulty handling of the specimen, misplacement, or improper selection of the section to be cut, or insufficient cuts or mounts, be led into error unavoidably, or through haste or many other circumstances be faulty in his conclusions. I have heard a well-known pathologist, now professor of that department in one of our southern universities, say that he would just as soon accept the clinical diagnosis of Dr. W. Joseph Hearn of Philadelphia as he would his findings under the microscope. It is not often convenient or even desirable to obtain a portion of a tumor for histological diagnosis, for many reasons, the most important of which I believe to be the possible and in many cases probable danger of producing regional and metastatic dissemination as a result of the surgical traumatism and consequent inflammation. Neither is the blood examination of definite value, as the toxins or isohemolysis of the serum of the blood in cases of carcinoma and sarcoma have a similar hemolytic action to that in cases of tuberculosis and syphilis. The presence of isohemolysis, together with the marked and progressive anemia characterized by a deficient number of erythrocytes and reduced hemoglobin, with leucocytes about normal, would point strongly to one of the three conditions. The progressive anemia is not influenced by medical treatment, as it usually is in cases of tuberculosis and syphilis.

The Roentgen ray is of distinct value and a very reliable aid in establishing a diagnosis, as both sarcoma and carcinoma destroy bone. Carcinoma reaching the maxillary bones by extension from a primary site in the epithelium of the skin or mucous membrane, or its extension along ducts and their tributaries in the associated glands, involves bone secondarily. Sarcoma may begin primarily within the bone or its periosteum and involve bone from its early development or by extension from a primary site external to the periosteum, but necessarily beneath the skin and mucous membrane.

The loss or disappearance of bone tissue in the absence of suppuration of bone, producing molecular disintegration or necrosis; previous loss from surgical traumatism, injury, or disease; cystic expansion and rarefaction, tuberculous or syphilitic granulomata, when shown in the skiagraph with fairly well-defined limitations, are distinctly diagnostic. When the regional loss of bone substance is replaced with tissue of greatly lessened density to the palpating finger in contrast to the normal surface resistance, smoothness, and outline of adjacent bone, together with altered and usually increased contour, the diagnosis becomes more certain.

COMPLICATION WITH CYSTS.

It is not always a very easy task to exclude the previously mentioned conditions, and of even more importance

to be considered is the fact that there may be associated with the sarcoma or carcinoma or occurring as a complication or incident, any one or several of these. The presence of a dental or dentigerous cyst would not exclude the development of sarcoma or carcinoma, although it would be comparatively infrequent in smaller cysts, but relatively more frequent in larger cysts of long standing. If in a large dental or dentigerous cyst a local area shows marked and quite rapid thickening, this is strongly suggestive of a malignant development beginning in the cyst wall. In four such cases I was able to make a diagnosis from the rather abrupt and local development, together with the regional loss of bone tissue in contrast to the rarefied and more definite outline of bone in the cyst wall and its region.

In dental and dentigerous cysts, the slow and uneventful development, except for the increased contour and often the displacement of teeth, the parchment-like crackling of the thin outer wall, fluctuation, the rarefaction of the bone, and the clear outline as shown by the skiagraph—and less distinctly by transillumination—are diagnostic. If yet in doubt, it is an easy task to introduce an aspirating needle through the thinnest portion of the wall. The finding of misplaced teeth would not prove the presence of a dentigerous cyst, as they might be unerupted malposed teeth incidental to a case of malignant disease. In virulent and rapidly spreading infections of bone tissue, the bone will be destroyed *en masse* and the evidence of sequestra be present, or in ordinary suppuration of bone and abscess formation there is the presence of a purulent cavity in bone with its sinus.

It is always well to ascertain if any previous operation or injury had occurred, and especially if any evidence of previous scar tissue is present, so as to correctly interpret the skiagram.

The skiagram will often reveal the cause of obscure enlargements incidentally discovered by the patient, dentist, or physician, of any portion of the maxillary bones, due to unerupted, malposed or impacted teeth, that would otherwise be considered a probable sarcoma.

FACTORS IN DIFFERENTIAL DIAGNOSIS.

To make a differential diagnosis between carcinoma and sarcoma, the patient's age and the tissue primarily involved are of greatest importance. Carcinoma of the mouth is quite rare before thirty years of age, but becomes more frequent in each decade of life subsequently. Sarcoma is more frequent before the thirtieth year, and decreases in each subsequent decade. If the primary site is the epithelium of the mouth, the case would be one of carcinoma, if the connective tissue, sarcoma. It is not always possible to obtain this knowledge, except when the case is seen early, or the patient is sufficiently intelligent and accurate in observation. This is impossible in a primary carcinoma of the epithelium of the maxillary sinus, and the diagnosis cannot be made in patients in the cancerous age, except for the fact that the frequency of sarcoma of the maxilla involving the mucous membrane of the sinus and occupying the same is much greater. However, in carcinoma of the mucous membrane of the maxillary sinus there are frequently more associated symptoms which occur from the surface of exposed carcinomatous tissue, such as sanguinous sero-mucous or muco-purulent discharge into the nasal cavity, which from decomposition is often quite offensive.

DIFFERENTIATION FROM EMPYEMA OF THE ANTRUM.

I also want to call attention to the fact that the tissues of carcinoma and sarcoma can become invaded and infected with pathogenic germs as in normal tissue—suppuration, abscess, or necrosis taking place owing to the invasion of pyogenic micro-organisms. When suppuration occurs in carcinomatous or sarcomatous tissue, partly or completely filling the maxillary sinus, a portion of the tissue is destroyed and

an abscess results. If the patient has not been under observation before such a complication develops, and is unable to give a clear history of preceding trouble, it is often very difficult to make a diagnosis other than empyema of the maxillary sinus. In empyema of the maxillary sinus the surrounding bone is practically never necrosed or destroyed, and retains its regular contour, surface smoothness, and resistance, except in rare cases when the pus is retained under considerable pressure, and the bony walls are somewhat displaced or bulged.

In malignant diseases complicated with suppuration and abscess, the carcinoma or sarcoma has probably destroyed portions of the wall and extended into surrounding tissue, which gives irregular density without the normal resistance of the bone. In malignant diseases the lost tissue is soon replaced, providing the suppuration is not so active that the tissue is destroyed as rapidly as it is formed. Even though the abscess in the region of the maxillary sinus did continue, the sarcoma or carcinoma would extend in the periphery, and develop more rapidly owing to the inflammatory stimulus. In empyema the improvement would be rapid and permanent in response to treatment.

Here also the skiagraph will show the loss of bone, but transillumination will not afford as reliable evidence. If there is reasonable doubt, and the treatment for empyema of the sinus has been decided upon, it would be best to secure, if possible, a section of tissue from the probable site of the malignant tissue and have it examined histologically. Scrapings from the maxillary sinus would not prove a reliable specimen.

DESTRUCTION OF THE ALVEOLUS. A CAUTION IN EXTRACTING.

Another important evidence of destruction of bone by sarcoma or carcinoma when it involves the alveolar process is the gradual loss of bony support to the teeth, which become functionless and are often detached. When the bone is partially destroyed, the remaining portions will frequently come away with the tooth in extracting, and portions of the malignant tissue also will often come away.

Dentists are frequently charged by ignorant patients with having caused the malignant disease when they extracted a troublesome and loosened tooth from an area of carcinoma and sarcoma which had already destroyed the alveolus, and was the cause of the suffering, rather than the tooth. To have allowed the tooth to remain would have prevented the criticism, and also the possibility of increasing the danger of regional or general dissemination from the surgical traumatism.

TUBERCULOUS LESIONS OF THE MOUTH.

Tuberculosis involving the tissues of the mouth can begin in the surface or deeper structures, and may be mistaken for carcinoma or sarcoma. Tuberculous lesions of the mouth that persist and become severe are not common, and are invariably secondary infections from pulmonary tuberculosis of an advanced stage, and should be strongly suspected upon finding the pulmonary involvement. It must be remembered that patients suffering from advanced pulmonary tuberculosis may develop carcinoma or sarcoma, and that the surface of a malignant tumor in the mouth in a phthisical patient would be invariably contaminated with tubercle bacilli, so that their presence would not prove the absence of malignant disease. Closer observation for a short period would show in sarcoma or carcinoma a steady increase in the contour and size of the tumor, whereas in tuberculosis, although the disease would have probably extended, there would be further loss of contour by degeneration and ulceration, or it might have been arrested by treatment.

A tubercle developing in the deeper tissues of the mouth will usually progress to a tuberculous or so-called cold abscess, which in its early stages is difficult to diagnose from sarcoma, espe-

cially if it is a primary tubercle. Tuberculous involvement of the maxillary bones secondary to tuberculous cervical adenitis does occur, and should be suspected. Small tuberculous abscesses not infrequently are found in the soft tissues adjacent to lesions of the teeth or gums which respond readily to treatment.

SYPHILITIC LESIONS.

Syphilitic lesions of the mouth, such as the primary ulcer or chancre and the tertiary granulomata or gummata, are more quickly and positively diagnosed by means of the Wassermann test. But in the absence of that evidence in the initial lesion, we find that the abrupt, rapid development of the ulcer with indurated base and the almost synchronous and marked regional enlargement of the lymphatic glands stand in marked contrast to the more slowly developing epithelioma, with less induration and late involvement of the regional glands; also the chancre is more frequent before the cancerous age than after. Again I would emphasize the frequency of cancer developing in a patient with also a positive Wassermann reaction. Here the persistent development uninfluenced by treatment, or a histological examination, will establish the diagnosis.

ACTINOMYCOSIS.

Actinomycosis is comparatively infrequent in man, but when present it is found most frequently in the region of the mouth and involving the maxillary bones, usually the mandible. The irregular ridge-like development and sinus formation, with the escaping characteristic yellow gritty granules contained in the pus—which under the microscope prove to be actinomyces, or ray fungus—makes the diagnosis.

ODONTOMA.

Odontoma, another comparatively rare disease, can be definitely diagnosed by means of the roentgen rays, yet without them its slow development and solidity, definition of location, contour, and outline would be distinctive, and an exploratory incision or puncture would establish a diagnosis. Osteoma is so rare in the maxillary bones that it is scarcely to be considered in the diagnosis of carcinoma or sarcoma.

DERMOID CYSTS.

Dermoid cysts developing in the mandible or maxilla are occasionally confused with sarcoma, but are so similar to dental and dentigerous cysts in expansion and rarefaction of bone and displacement of teeth that the same methods of diagnosis are available. Dermoids of the floor of the mouth or soft palate, and retention cysts, such as mucous cysts of the lips and ranula of the floor of the mouth, are recognized by the fluctuation, elasticity, and translucence, or doughy resistance.

SUMMARY.

To recapitulate briefly, the diagnosis of malignant disease of the mouth, namely, carcinoma and sarcoma, is largely dependent upon the characteristic feature of rapid increase in intensity to a fatal ending. The associated manifestations of this increase are inevitable destruction of the normal tissue in the region, with the attendant loss of function and replacement with tumor tissue; toxic poisoning and hemolytic action upon the blood, producing progressive anemia, loss in body weight, and increasing prostration. The regional or general development of similar tumors, together with the more rapid deterioration of the health of the patient, is a further manifestation of the disease, and usually occurs.

The characteristic pain in malignant disease, which is sharp and lancinating and late in development, or absent until inflammatory complications occur, cannot be considered as a diagnostic factor.

The history of frequent occurrences of similar diseases in members of a patient's family, or their entire absence, should not have much influence in determining the diagnosis.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

LYMPHADENITIS IN INFANTS AND CHILDREN.

By OSCAR M. SCHLOSS, M.D., New York, N. Y.

(Read before the Eastern Association of Graduates of the Angle School of Orthodontia, at its annual meeting, New York City, April 23, 1914.)

THE general etiology of lymphadenitis is the same, no matter which group or groups of glands are affected, and since the glands of the head and neck are of particular interest to this society, my remarks will be confined mainly to the disease in this location.

ANATOMIC CONSIDERATIONS.

A prolonged discussion of the anatomy and physiology of the lymphatic glands would be out of place, but I wish to recall a few important points. Although the glands which drain the tissues of the head and neck are divided into several anatomic groups, it is important to remember that this division applies only in a restricted sense, for by means of lymphatic vessels free communication exists between all neighboring glands. For this reason it is easy for disease of one group of glands to spread to another group in the same vicinity.

The principal groups of glands with which we are concerned are the retropharyngeal, suboccipital, mastoid, parotid, internal maxillary, submaxillary, superficial and deep cervical. The suboccipital, mastoid, and parotid glands drain areas of the scalp. The internal maxillary glands are placed deeply beneath the ramus of the lower jaw; they receive the lymphatics arising in the temporal, zygomatic, and orbital fossæ, the roof of the mouth, and the soft palate. The *submaxillary* glands receive the vessels from the floor of the mouth, the gums, and the superficial ones from the face. They are from eight to ten in number, and lie beneath the base of the mandible. The retropharyngeal glands are from one to three in number, are very small, and lie deeply against the pharyngeal fascia. They receive part of the lymph from the naso-pharynx. The *superficial cervical* glands are usually from four to six in number, and lie along the external jugular vein between the platysma and the deep fascia; they drain parts of the scalp and face. The *deep cervical* glands are very numerous, and are the principal glands of this region, receiving communicating lymphatic vessels from practically every group of glands of the head and face. They are subdivided into two main groups, the *superior* and *inferior.* The former extend from the bifurcation of the carotid artery to the base of the skull and lie for the most part along the external jugular vein. These glands receive lymph from the tongue, larynx, lower part of the pharynx—including the tonsils—some vessels from the thyroid gland, and from other adjacent lymphatic glands. The inferior group is around the lower part of the internal jugular vein. They receive communicating vessels from all of the other groups of cervical glands.

The structure of lymph glands consists essentially of a definite arrangement of lymphocytic cells. The cells are arranged in closely packed groups, which are called germ centers. Between the germ centers and around the periphery of the whole collection of cellular tissue are lymph sinuses. The whole gland is inclosed in a dense, fibrous capsule.

PHYSIOLOGIC CONSIDERATIONS.

There is much about the function of the lymphatic tissue of the body which

is imperfectly understood, but there are certain accepted theories which are of importance in relation to the subject of this paper. It seems very probable that the lymphocyte cell of the blood is formed in the lymphatic glands, and in this way the supply is kept normal. The most important function of the lymph nodes—in the light of our present knowledge—is that of a filter for removing pathogenic organisms and preventing their entrance into the general circulation. Just how the bacteria are destroyed is obscure, but the lymph nodes contain numbers of large endothelioid cells the function of which is probably phagocytic. Whether any chemical agency is concerned in the destruction of micro-organisms is not definitely known.

PATHOLOGY OF ACUTE ADENITIS.

The pathology of acute adenitis is essentially that of inflammation. Bacteria reach the glands either in too great numbers or of too great virulence to be destroyed; they multiply and cause inflammatory reaction. There is round-celled infiltration, swelling, and edema of the affected glands. From this stage there are two possible outcomes: The tissue is able to overcome the infection, and a gradual resolution takes place, or the gland undergoes necrosis with the formation of pus and an abscess cavity.

Lymphadenitis of mild degree occurs as a part of several general diseases. In scarlet fever there is swelling of all the superficial lymph nodes; in syphilis the same holds true.

TUBERCULOUS LYMPHADENITIS.

Acute lymphadenitis may be divided into two main groups, the simple pyogenic form and the tuberculous. Tuberculous lymphadenitis is a characteristic condition, and practically always passes into a subacute or chronic stage. As a rule, the disease begins in the inferior group of the deep cervical glands, but is rarely confined to this group. Usually the adjacent groups, wholly or in part, are affected. The general opinion at present is that the most common portal of entry is the tonsils or naso-pharyngeal adenoid tissue. In some instances the disease is due to a frank tuberculosis of the tonsils, but it is also possible that the bacilli may enter the tonsils without causing manifest lesions, pass to the lymph glands, and there set up tuberculosis. This assumption is rendered probable by the experiments of Wright. Dye stuffs deposited on the tonsils find their way quickly to the glands which receive the tonsillar lymph supply. There is one other origin of tuberculous lymphadenitis. From pulmonary or other visceral tuberculosis, the adjacent lymph nodes become affected, and by retrograde infection the lymph glands of the neck may be involved.

The diagnosis of tuberculous adenitis is made evident by the chronic nature of the infection, the hard glandular masses which have a tendency to abscess formation relatively late in the course of the disease. The abscess, when such occurs, is usually of the cold type, and may affect only a portion of an affected gland. Such abscesses lead to multiple sinuses, which have little tendency to heal.

PYOGENIC LYMPHADENITIS.

The next form of lymphadenitis to be considered—and by far the most frequent and important—is that due to the pyogenic organisms. The bacteria most frequently concerned are streptococci and staphylococci. As stated before, this form is directly dependent on some focus of infection in the area drained by the affected glands. As a rule, the source is easily found. An area of infection on the scalp may cause enlargement of the parotid, mastoid, or sub-occipital glands, and later of the superficial and perhaps the deep cervicals, which are in free communication with those first affected. It is unnecessary to consider each group of glands separately, as the general principle of localization is the same and has been mentioned under the heading of anatomical arrangement. As previously stated, the portal of entry is usually obvious, but

there is one important exception. It seems very probable that micro-organisms may pass through the tonsils or naso-pharyngeal adenoid tissue to the lymphatic glands without causing clinical signs of infection. That in such cases an inflammation may be actually present, but below the threshold of clinical perception, is possible, but for all practical purposes the original statement holds true.

The most frequent cause of acute cervical lymphadenitis is inflammation of the tonsils or naso-pharyngeal adenoid tissue. In the former instance, the first sign of glandular involvement is usually one of the superior deep cervicals situated just below the angle of the jaw and anterior to the insertion of the sterno-mastoid muscle. This gland has been called the tonsillar gland (Wood). In the case of naso-pharyngeal infection, either the retropharyngeal glands alone or the retropharyngeal and deep cervicals are affected. Most of the naso-pharyngeal lymphatics pass directly to the deep cervical glands, a few pass first to the retropharyngeal glands, but the efferent vessels from these finally reach the deep cervicals. For these reasons in naso-pharyngeal infections the superior deep cervical glands are enlarged in practically every case. Enlargement of the retropharyngeal glands may be detected by digital examination, and retropharyngeal abscess gives rise to characteristic signs of nasal and laryngeal obstruction.

CLINICAL COURSE OF ACUTE ADENITIS.

The clinical course of acute adenitis is extremely variable, so that no definite picture holds good for all cases. Moreover, the primary infection in many instances is responsible for part of the symptoms. As is true of all acute infections, the symptoms and pathological changes are the result of two agencies, viz, the virulence of the infecting organism and the resistance of the tissue. In some instances, a moderate or slight enlargement of the affected glands, accompanied by no general symptoms, is the only clinical sign of the disease. In other cases, however, the glands show great swelling and inflammatory reaction; fever, prostration and other general symptoms are severe. In such cases, abscess often results. The temperature is, as a rule, moderately elevated, but in many cases, during some stage of the disease, it reaches 103° to 105° F. The glandular enlargement is dependent, to a great extent, on the number of glands affected. The enlargement may remain for some time, the condition passing into a subacute or chronic stage; suppuration may occur requiring operation, or the swelling may result without suppuration.

SUBACUTE CERVICAL LYMPHADENITIS.

There are many instances of subacute cervical lymphadenitis in which the glandular enlargement is of slight degree, causing no distinct local symptoms, but with persistence of the swelling for many months. These cases are probably dependent on mild infections which continue for a long period of time.

HODGKIN'S DISEASE, OR PSEUDOLEUKEMIA.

Enlargement of the lymphatic glands forms one of the prominent features of several diseases. In Hodgkin's disease or pseudoleukemia—a disease usually fatal—the enlargement reaches an extreme degree. The etiology of this disease is obscure, but recently a micro-organism has been isolated which is probably the direct cause.

LYMPHATIC LEUKEMIA. STATUS LYMPHATICUS.

In lymphatic leukemia—a form of anemia with pronounced increase of the white blood cells—marked enlargement of the lymphatic glands is a striking symptom. Glandular fever is characterized by enlargement of the lymph nodes, often accompanied by severe general disturbances and at times by enlargement of the spleen. Slight chronic enlargement in association with hypertrophy of the thymus gland is a prominent sign

in the diathesis called variously lymphatism, status thymo-lymphaticus or status lymphaticus. Little definite is known of the etiology of this condition, but it has attracted very wide attention owing to the circumstance that affected individuals often die suddenly from trivial causes, such as anesthesia, injection of antitoxin, a slight surgical injury, etc.

I have tried to outline merely the important causes of lymphatic enlargement and to emphasize the fact that the acute forms are dependent on foci of infection in the area drained by the affected glands. As a rule, the foci are very evident, and upon such localization is dependent the prophylaxis and to a great extent the treatment.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

Proceedings of Societies.

EASTERN ASSOCIATION OF GRADUATES OF THE ANGLE SCHOOL OF ORTHODONTIA.

Fifth Annual Meeting, New York, April 23-25, 1914.

(Continued from page 1079.)

Friday—*Morning Session.*

The meeting was called to order on Friday morning, April 24th, at 9.30 o'clock, by the president, Dr. A. W. Crosby.

The President announced as the first paper of the morning session one by Mr. W. F. Blades, Cold Spring Harbor, L. I., entitled "Heredity as a Factor in Hare-lip and Cleft Palate."

[This paper is printed in full at page 1241 of the present issue of the Cosmos.]

Discussion.

Dr. H. A. Baker, Boston, Mass. The essayist has gone into the subject so deeply that there is not much left for me to add. My efforts have been directed toward making appliances for correcting the defects of speech caused by cleft palate, rather than the study of the influences of heredity in causing this distressing conditions. My observations, during forty-two years of experience in treating cleft-palate deformities, coincide with the essayist's statement that we cannot put much dependence on what patients tell us of the family history. They like to attribute the cause of the deformity to prenatal influence, and feel obliged to make the excuse that the child was "marked" by some grotesque sight which the mother had witnessed while carrying the infant, being ignorant of the fact that the maldevelopment was due to an embryological error.

Speaking of heredity, I can remember two families in which the immediate members were afflicted with cleft palate; also another instance of cousins who were thus afflicted. I might say in closing, that, as I review my life's work, there is no branch of our art which gives such deep and enduring satisfaction as treating these poor unfortunates whose speech is so crippled as to make them

outcasts of society, and I trust that I may continue to give these unfortunates service and gain their gratitude for years to come.

Dr. J. L. Young, New York. I should like to ask if the essayist has noticed any more hare-lip on the left side in human beings than on the right? Judging from what he said, he has not noticed this in dogs.

Mr. Blades. In dogs, this deformity occurs a great deal more frequently on the left than on the right side. In human beings it is more nearly equally distributed. The exact proportions, however, I am unable to state.

Dr. F. A. Gough, Brooklyn. This is an intensely interesting subject to me, and I wonder if the essayist would like to have other cases reported. We run across a great many cases of cleft palate, and I wonder if it would be any help to him in his investigations to know about them, and to have the opportunity to follow them up as he has done in other cases. If such is the case, I would be glad to furnish him with a large number of cases.

Investigations similar to those which the essayist is conducting in regard to hare-lip would be of interest and value to us in regard to missing germs of the teeth, such as lateral incisors. For instance, I know of four children in one family in every one of whom the lateral incisors are missing, and in the mother also the upper lateral incisor is missing. The father has a normal denture, however. In the majority of cases of missing germs of lateral incisors there is some history in the family with a bearing thereon. Upon investigation it is usually found that the same condition exists in some other member of the family, and, unlike cleft-palate cases, the patients are willing to tell all they know about it, and for that reason such cases would be easy to follow up.

Dr. Ferris. I should like to ask the essayist's opinion on the possible effect of ergot medication during pregnancy on cleft palate and hare-lip?

Mr. Blades. I have used ergot only once, in the case I mentioned where there were seven puppies in the litter from a bitch with hare-lip, and every one of the pups was perfectly normal.

Dr. Stanton. The essayist has probably changed our view in regard to the influence of malocclusion. You may remember that your committee was asked to report on cases in which there was an absence of lateral incisors, and I pass this blank form around in order to show the method which we have adopted for charting such cases. If many members would record such cases as Dr. Gough has cited, we could chart a number of them and obtain valuable data.

Dr. Carrabine. The essayist said that by crossing breeds of dogs, cleft palate was produced. I should like to ask if the crossing of different races and nationalities might not have some influence on producing cleft palate?

Mr. Blades. I am afraid that the last speaker misunderstood my argument. In speaking of crossing dogs, I simply meant to show that the French bull of the present time undoubtedly has a great deal of English bull in him, and that the pup with the hare-lip is found only in these three breeds. We do not find it either more or less frequently in cross breeds than in any other.

Dr. V. E. Mitchell, New York. The subject under discussion interests me very much, especially as presented by Mr. Blades. I feel much like Dr. Baker, that for some years, whenever we did not know any other reason for abnormal conditions, we have been placing all the blame on heredity. There may be and probably is some hereditary influence in cleft palate and hare-lip, but I do not think that it is primarily the whole cause. There are many other factors to be taken into consideration—as, for instance, nutrition. There must be a primary cause with the hereditary influence back of it, or it may be either one or both, or it may still be something else than either of these. The scientific investigator of these and similar conditions is usually biased. For instance, Mr. Blades is looking for cleft palate in a family with that predominant thought

in mind, though he disavows that. If we looked for other causes than heredity as carefully, and if members of the profession investigated other factors and compared their findings, some definite conclusion might be reached as to the real cause of cleft palate.

Mr. Blades has spoken of heredity as influencing the color of eyes and hair. Yet we know that the color of the eyes of an infant is different from what it will be when the child becomes an adult. The same applies to the hair. Taking my own family as an example; My wife has dark hair, and mine is dark, yet our children have very light golden hair. When they grow up, their hair will probably not be like mine nor that of my wife, but a cross between the two.

Another feature of heredity is frequently overlooked—that is, that nature tries to revert to the normal. Cleft palate is an abnormality, and nature tries her best to return to the normal. Therefore, when we find this anomaly getting less in a family, we know that nature is working in her own proper way to restore normal conditions.

I am studying this subject, but have not had the time to make thoroughly scientific investigations. Some members of the profession should attack this problem from its many different sides, and compile their results. I think that the work of Mr. Blades is going to be a wonderful help to us in solving this problem.

Dr. Baker. There are a great many cleft-palate patients who are wearing appliances, and a great many who have been operated upon; have you collected any data in regard to these?

Mr. Blades. I have seen a number of cases that had been operated upon, and a number in which appliances were being worn, and again others that had both.

Dr. Baker. What percentage of cases showed improvement in speech after operation?

Mr. Blades. I am unable to answer this question. I have not compiled any statistics with that particular point in view.

Dr. Baker. Did you ever see one?

Mr. Blades. Yes, several; and also some with appliances.

The next order of business as announced by the President was the reading of a paper by Dr. Oscar M. Schloss, New York, entitled "Lymphadenitis in Infants and Children."

[This paper is printed in full at page 1250 of the present issue of the Cosmos.]

Discussion.

Dr. Milo Hellman, New York. This morning's session of the association is very encouraging, and I think we should consider ourselves fortunate to have with us such able essayists at our meeting. Dr. Stanton deserves to be congratulated for giving us the opportunity to hear such papers.

As to the last essay, I want to mention a matter which will bring the subject into more direct relation to our own work. I wish to ask the essayist for his opinion in reference to a certain incident which occurred in my practice some time ago. I happened to be treating two children who developed chronic adenitis. These children were referred to a physician who recommended the removal of the orthodontic appliances in their mouths. I do not know whether Dr. Schloss is familiar with our methods of procedure, which I can explain to him in a few words. By adjusting very fine appliances on the teeth, we exert a very mild stimulus upon the bone over the teeth, moving the teeth through bony tissue into their normal positions. We aim to stimulate physiological bone development as much as possible, and it has been proved experimentally that bone is changed in structure by the pressure exerted by these appliances. By these appliances pressure may be exerted for years, the tissues, in a great majority of cases, seeming to yield very readily to the pressure without causing any inflammatory disturbances in the mouth. When the physician mentioned referred the two patients to me for removing the appliances,

I immediately wrote him a letter asking his opinion regarding the condition of these children, as I was ignorant of that particular disease, and asked him how the appliances might affect them. I shall read to you a few sentences of his letter to indicate his opinion in this matter. [Dr. Hellman then read extracts from the letter referred to.]

The mother of these children worried very much over the outcome of their condition, and, after consulting with a number of men, she was very strongly against having any operation performed for fear of a scar remaining. The physician, therefore, being familiar with the X ray, treated the children with X rays three times a week for probably five months. Since the condition, however, did not yield to treatment, the mother finally consented to an operation, but in order to avoid a large scar, the physician made a small opening and only removed a portion of the gland, leaving the other for further treatment. It would be interesting to hear Dr. Schloss' opinion as to such a procedure.

Dr. Schloss. I do not hesitate to express an opinion as to the letter read in part by Dr. Hellman. So far as I know, there has been no definite opinion among pediatrists in regard to the influence of the brace *per se*. It is recognized, of course, that the ultimate results of the application of the brace are beneficial, but, so far as I know, no one has stated that the brace exerts any harmful influence. Personally I have never observed the condition mentioned, but I should not hesitate to say that harmful influences are not probable. As I understand it, these appliances do not touch the gums, but are applied only to the teeth, and, this being true, they could in no way be responsible for any glandular enlargement. The only circumstance that one could conceive of, sufficient to cause lymphadenitis would be excessive traction causing injury to the tissues, and forming a portal of entry for infection. Such a condition would usually be evidenced by the formation of pus, or at least a reddening of the margins of the gums. The causes of adenitis are so many that one has to be extremely careful in expressing an opinion in reference to a case of this kind. I think the most frequent cause, however, is nasal and pharyngeal infection. The cases are often unrecognized because these regions in infants are inaccessible to examination, and I have often seen adenoids removed which showed evidence of repeated infection, and that in infants with chronically enlarged glands. In a number of children there is a moderate degree of lymphatic enlargement from no apparent cause.

There is one point on which I hesitate to express an opinion before this society, and that is the eruption of teeth. It is absolutely inconceivable how the mere eruption of the teeth unaccompanied by infection could cause any change in the adjacent lymph glands.

Dr. Hellman. I might add that I consulted a prominent X-ray specialist, asking how he treated adenitis with the X ray, and he said that such was not his practice. I asked him if it were possible. "Well," he said, "it may be treated, but I would not dare apply the X ray more often than once in two weeks."

Dr. F. L. Stanton, New York. The essayist's paper is very timely, as many of us have been requested to remove appliances under conditions similar to those mentioned. I recall the case of a boy in which I was requested by the physician to remove an appliance which had been in the mouth for six months, and was then being worn as a retaining appliance, but no attention had been paid to it in connection with the other conditions. This boy was being treated by one of the most prominent pediatrists in New York; I suddenly received a call and was told that the appliance must come off. I told the family that the dentist had no option in the matter, and removed the appliance—in doing so I infected my own eye with a little flake of cement from the appliance. The boy's appetite did not return nor the case improve as was expected, and the specialist still has trouble on his hands.

In several other cases I have been called upon to remove appliances, but

the general opinion seems to be that there is no direct connection between orthodontic appliances and enlargement of glands. The strong argument in our favor is that the point of infection is easily found, as Dr. Schloss has pointed out. If the appliance, viz, the molar attachments, is in contact with the gums, then we can see the points of infection, and if these points are kept in good order, I see no reason why we should not be relieved of all responsibility.

This paper is very timely, because it is bringing an argument in regard to a condition which will arise more or less frequently in our practice.

Dr. H. E. Kelsey, Baltimore, Md. I have had one case in which the call was quick and urgent that an appliance be removed. I was out of the city at the time, and a dentist whom I know very well removed the appliance at the request of the physician, who said he did not know that this was the cause of the gingivitis, but he did not like to have the appliance in the mouth when he operated upon the child. The physician operated on the child after the appliance was removed, and the child had a rapid recovery. This appliance was of the character Dr. Hellman spoke of, merely a little retaining arch with the anchor bands attached to the molar teeth, and the dentist who removed it assured me that there was not the remotest evidence of any irritation at the time of the removal of the appliance. I had never observed any irritation in the mouth, and there had been none during treatment. A second dentist who was called in at the same time exonerated one of the molar teeth on which one of the anchor bands was placed, because it had in it a large filling which he had inserted previously, but he said that from any test he made there was no evidence that the tooth was giving any disturbance. His record was that the tooth was vital, with no history to the contrary. The rapid recovery of the patient seemed to indicate that the teeth were not involved. This same child had an appliance on the upper arch also, the removal of which the physician did not request, and it is still there.

I think it is natural for a physician who is called in to diagnose such a condition to cast about for the most obvious cause; he may not insist that an orthodontic appliance *is* the cause, but he may think that it is a *possible* cause, and for that reason may not be willing to have the appliance remain in the mouth.

Dr. W. H. Pearson, Norfolk, Va. It is true that the physician is attributing many untoward results to the use of bands and appliances of various kinds, but, if we stop to think for a moment, we realize that he has grounds for his suspicions. We must keep in mind the fact that the Angle method and that followed by the general practitioner of dentistry is different. The method of the general practitioner consists in removing the effect without looking into the cause; his idea is to put on all the pressure that the patient will tolerate, and this, in a large percentage of cases, causes inflammation. Of course these cases come to the physician, and he is not able to distinguish the proper from the improper treatment. Physicians lack in knowledge of our methods, and it is up to us to educate them to distinguish between good and bad practice. I think, as time goes on, if we will discuss our work with physicians as much as possible and show them the difference in the various treatments, we Angle followers will have no trouble in convincing them about the justification of the use of bands.

Dr. H. C. Ferris, New York. I had one case last year, but fortunately it was in the family of a physician, a very brilliant pathologist. I discovered an enlargement of the cervical and submaxillary glands, and called attention thereto. Instead of asking that the appliance be removed, the physician treated the patient, who happened to be his own son, and it was only a matter of two or three weeks when the disturbance disappeared without any alteration of the appliance whatever.

Member. What was the cause?

Dr. Ferris. I do not know that any

cause was given. I think there was a tubercular history in the family, but whether it was treated with tuberculin or not, I do not know.

Dr. MILO HELLMAN, New York. I might add another remark in this connection. Since I spoke of these two cases in Philadelphia, I remembered a third one. A rhinologist told me that he suspected infection of the glands in my patient, and I was frightened because of my previous experience. I asked him if he wanted me to take off the appliance. He assured me, however, that he was just calling my attention to the condition, in case the patient should make any inquiries. He said that the patient had had the same trouble five years previously, and that I need not pay any attention to it, as he had taken care of it. In some of these cases there is a history of previous disease long before we started treatment.

Dr. JANE G. BUNKER, Brooklyn. I had a case in which the physician demanded positively that the apparatus come off. I refused as positively to take it off, and the case recovered in about ten days.

Dr. KELSEY. I might add that the patient I referred to had severe nasal conditions, and was in every way likely to develop such conditions even if she had no appliance in the mouth. After my treatment had been discontinued, and the appliance out of the mouth for a year, this patient had an affection of the glands of the neck which eventually required operation, and she made a good recovery. Some time afterward I felt that I could improve her dental condition, and inserted an appliance, which produced, to my mind, an excellent result. If the condition of the glands referred to had occurred at the time when the appliance was in the mouth, I believe it would have been suspected as being the cause.

Dr. MINEZ, Newark, N. J. I had a case in which the physician insisted that the appliance be removed, but I asked him to leave it a little longer, until he was sure of the cause of infection, and the case recovered.

Dr. JOHN MILLS, Toronto. I had an experience with a physician who insisted on having an appliance taken off, but he came back eight months afterward and told me that he had done his best but was unable to do anything for the girl, and that I might just as well put the appliance on again. I did so and went on with the treatment, and the girl improved, although the physician did not treat her any further.

Dr. SCHLOSS (closing the discussion). I really have nothing further to say—unless I have left some question unanswered. It seems that the subject has been very well covered, and I only wish to express, in closing, my thanks for your courteous reception of my paper.

(To be continued.)

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

Fifty-first Annual Meeting, held at Delaware Water Gap, May 26-28, 1914.

THE fifty-first annual meeting of the Susquehanna Dental Association was held in the Water Gap House, Delaware Water Gap, Pa., May 26–28, 1914.

The meeting was called to order on Tuesday afternoon, May 26th, at 2.30 o'clock, by the president, Dr. W. Clay Middaugh, Easton, Pa.

Dr. T. W. THOMAS, Wilkes-Barre, invoked divine blessings on the deliberations of the association.

The Executive Committee presented as its report the program as printed, with some alterations as announced by the chairman, Dr. V. S. Jones.

Dr. T. W. Thomas, vice-president, took the chair, while the president, Dr. W. CLAY MIDDAUGH, Easton, read his annual address.

Dr. Thomas appointed as the committee to consider the President's address, Drs. Stratton, Davenport, and Van Horn.

Dr. Middaugh resumed the chair and announced as the next order of business the reading of the minutes of the previous meeting by the secretary, Dr. Donnegan. The minutes were approved as read.

The President announced as the next order of business the reading of a paper by Dr. SINCLAIR TOUSEY, New York, entitled "X-ray Measurement of the Permanent Teeth Before Eruption to Provide for Early Regulation of the Dental Arch." [In substance this paper appeared in the DENTAL COSMOS for June 1913, page 619.]

The President read a letter from Dr. E. G. Link, Rochester, N. Y., chairman of the Local Committee of Arrangements of the National Dental Association, sending greetings to the association and inviting the members of the society to attend the coming National meeting.

The Secretary presented a number of applications for membership, which were referred to the Board of Censors for action.

The meeting then adjourned until the evening session.

TUESDAY—*Evening Session.*

The meeting was called to order Tuesday evening, May 26th, at 8 o'clock, by the president, Dr. Middaugh.

The Secretary read the resignations of Dr. Hugo Hark of Bethlehem, Dr. F. P. Laymon, Dr. I. Kaufman, and Dr. W. H. Conklin.

Dr. JONES moved that the resignations be accepted with the exception of that of Dr. Hark, and that Dr. Hark be made a corresponding member of the association. (Motion carried.)

The Secretary read a communication from Dr. F. L. Platt, chairman of the Panama-Pacific Dental Congress, appointing as the Executive Committee of the Congress for Pennsylvania, Drs. W. A. Capon, W. H. Fundenberg, G. S. Schlegel, D. B. Williams, and V. S. Jones.

The next order of business was the reading of a paper by Dr. W. J. ROE, Philadelphia, entitled "The Diagnosis of Malignant Diseases of the Mouth."

[This paper is printed in full at page 1245 of the present issue of the COSMOS.]

Discussion.

Dr. E. P. CARTY, Scranton. Dr. Roe has covered the subject of diagnosis of malignant disease so thoroughly that there is little room left for discussion. There is one feature with regard to malignant cases which, I find, the general practitioner does not consider sufficiently. The general practitioner has the tendency to treat malignant cases which occasionally present themselves to him too lightly, to dismiss his patients and have them come back later to see how the case is getting along. He makes an examination of the tooth conditions, and goes no farther. These patients go from one practitioner to another, until someone finally recognizes that their case is a malignant one which should have been operated on months and sometimes years previously in order to overcome the trouble. In diagnosing these troubles, we find that they usually originate as Dr. Roe says: There has been a benign condition of the mouth; then we find that some ill-fitting plate has been causing irritation for years, until finally a malignant condition is suddenly developed.

This recalls to my mind a case which came under my observation recently. The patient had gone the round of several offices where examinations were made, and finally she presented herself to me. I found that the case was undoubtedly one of carcinoma. If anyone has seen a case of carcinoma, he will be able to recognize it easily the second time. I told the patient that a histological examination was desirable, and advised her to go to the hospital for that purpose. The examination being made at the hospital, the case was pronounced to be one of cancer of the mandible. The patient was not satisfied with the diagnosis and went to another physician, who examined her, and then said, "We will open that up and cure your case." After anesthetizing the patient with ether, he started to open the tissues, and the patient died in the chair. A post-mortem examination was made, and it was found to be a case of carcinoma, and that the mandible had completely disintegrated excepting a small portion of bone that held the jaw in position.

I have in mind also another case in which the patient went to a dentist with some trouble in the maxilla. The dentist extracted several teeth; the patient, however, did not get well, but developed carcinoma. The impression was left on the family that, if the teeth had not been extracted, the man would not have had carcinoma.

I would like to ask Dr. Roe for an explanation of why we find more cancrum oris in females than in males? At what stage does the malignancy of a malignant case set in? Does it start in the beginning of its career or at a certain stage when it becomes irritated? I should also like to ask what percentage of cases can be cured by operation?

Dr. J. C. HERTZ, Easton. Dr. Roe has given us a very valuable and interesting treatise on the diagnosis of malignant diseases of the mouth, and it would require a specialist properly to discuss his paper. I shall therefore ask only one or two questions, and mention one or two instances that have come to my notice. For one thing, I should like to request Dr. Roe to give, in closing, the differential diagnosis between cancrum oris and syphilitic patches?

One or two incidents of my office practice may be worth mentioning. A woman, thirty-two years of age, was referred to me five or six months ago with a troublesome upper central incisor. The teeth had been treated, the right one containing a dressing of one of the medicaments we use for disinfection. She complained of much pain, but I did not believe that it came from the right central, as it was in such a condition that the gases could escape, and it seemed to me that the pain was much exaggerated, unless it should come from the left central incisor. The teeth were all affected with erosion at the cervical margins, so much so that there was almost an exposure of the pulp in the left central incisor. The right central had been devitalized and the pulp removed. The erosion appeared to me to be of acid character. The patient stated that another dentist had told her

that such an exposure was very unusual. I drilled into the left central at the proper point, viz, in the lingual surface of the tooth, and removed the pulp. I then treated the right central, which had a fistulous opening, and immediately the patient said there was unusual relief. This relief was so immediate that I thought the trouble to be due to some nervous reaction of other than dental origin. I then consulted her family physician, who advised me to go slowly with the patient, as she was in an extremely nervous condition, and run down to such a degree that she had certain mental trouble. A few weeks afterward I had to refer the patient to another practitioner, who continued my treatment, but I learned later that owing to the condition of the tooth it was removed. The right central was found to be necrotic, about one-third of the root having wasted away. This case emphasizes the fact that pain of this character may be misleading. I learned afterward from her physician that she had been suffering or claimed to be suffering from heart affection.

The essayist spoke about the confusion resulting sometimes in the differential diagnosing of a tuberculous cold abscess from one of sarcoma. I recall a case of this kind which came to my office recently and which was referred to a physician, who afterward pronounced it to be a case of tuberculosis, and treated the patient accordingly. This emphasizes the fact that we should be very careful in diagnosing such cases.

Dr. W. C. Middaugh, Easton. I would like to say a few words about one of the cases referred to by Dr. Roe. This case was a rather curious one; if it had been a malignant tumor, it would probably have resulted in the patient's death. The patient lived in the country, and her physician was treating her for an abscessed tooth. The treatment consisted of what I called "absent treatment." The physician met the patient on the road one day, looked at her face, and diagnosed the case as one of abscessed tooth, while, as a matter of fact, the patient had no teeth in the upper jaw, but was wearing an artificial plate which was broken and caused much irritation and swelling of the soft parts. The treatment of the physician gave no relief, so he finally opened the abscess as he thought it, but the tissues did not heal. The gums became infected, and a fairly extensive ulcer resulted, and when the patient came to me I probed through the opening the physician had made and found tooth structure. I asked that an X-ray be made, after which the case was referred to Dr. Roe for the removal of an odontoma.

Dr. Roe asserted that he does not always depend on the pathologist's examination. This reminds me of a case that came under my observation a few years ago. The patient was a young lady whom I knew very well, who had a sort of mushroom tumor growing between the first and second bicuspids. She had a little pyorrhea around the roots of some of her teeth. I removed the growth with a lancet, scraped the roots, treated the teeth for pyorrhea and requested her to return in five or six weeks for further treatment. She came back six months later, when another mushroom growth had started. A portion of the tissue was removed and sent to a pathologist for examination, who reported the case to be one of giant-cell sarcoma. The physician claimed that the patient would not live more than a few weeks, unless she was transported to the city and operated upon. I asked the pathologist for the slides and brought them to Philadelphia, where the case was diagnosed as one of hypertrophied tissue, which was removed—the patient being alive today. That was two years ago.

Dr. Roe (closing the discussion). In answer to Dr. Carty's question, it has not been my experience that cancrum oris occurs more frequently in females than in males. I have only seen about twelve cases of cancrum oris. It is the general belief that cancrum oris practically occurs in children only, and is a concomitant of some of the severe illnesses of childhood, like scarlet fever, typhoid fever, etc. Among the twelve or more cases I have treated, at least seven

of the number occurred in adults, and four of these were of quite advanced ages. I think as far as sex is concerned the ratio of distribution is about equal. I want to say incidentally that in cancrum oris I have been using empirically anti-diphtheritic serum, and I believe it to be a specific in these cases. In other words, it arrests the process of cancrum oris as positively and decidedly as it arrests the spread of the diphtheritic membrane; so I rely upon the anti-diphtheritic serum treatment almost exclusively. In addition, I use simply the mildest and blandest kind of washes. Since I have followed this line of treatment, I have not lost a case except when the cancrum oris was the result of some inevitable condition, such as sarcoma, tuberculosis, advanced kidney or cardiac, or severe arterio-sclerotic conditions. In a primary case of cancrum oris, I believe, anti-diphtheritic serum will cure ninety-five per cent. of the cases, and the other five per cent. will be due probably to pneumonia which has already developed to the stage that it cannot be arrested when the case comes under treatment.

With reference to the word malignancy, the term "malignant" indicates the power of destroying life, the inevitable destruction of life, the disease increasing in degree in proportion to the amount of growth of cancerous and destruction of normal tissue. In proportion to the extent of involvement or general dissemination of the disease will deterioration of health occur and the tissue readily succumb. The constitutional symptoms are not manifest in the early stage, although there is inevitably some deterioration of vitality from the inception, but not a manifest one; as the tumor develops, however, to an appreciable size, and as toxins are produced, and in addition, as soon as complications such as infection occur, then the case becomes one of double infection.

With reference to the percentage of cures by operation, that depends upon the skill of the surgeon and the thoroughness and completeness of the excision of the entire growth. In other words, the surgeon who successfully operates never contaminates any wound with cells or toxins, but sacrifices as much of the tissue in the affected region as possible, keeps on the outside of it and makes a true, clean, accurate anatomical excision. The surgeon who does that, not only in malignant growths of the mouth but in any operation on the body, will cure fifty per cent. of all cases, and at least eighty per cent. of selected cases, and he can cure ninety-nine per cent. of sarcomata and epulids of the mouth, which are almost all sarcomata.

Dr. Hertz inquired as to the differential diagnosis between cancrum oris and syphilitic patches; cancrum sores or aphthous stomatitis he means, I presume. In the syphilitic manifestations the area of mucous membrane is not definitely defined, and the ulceration is very superficial. There is a superficial ulceration with marked discoloration which fuses into the normal mucous membrane. There is practically no pain; the ulcers are more widely separated, and their location is not characteristic; they are found on the inner surface of the lips, near the commissure of the mouth and upon the anterior pillars or margins of the fauces. In aphthous stomatitis, there are elevations on the surface of the zone of inflammation, and it is very painful, in contrast to the slight denudation of the surface ulceration in mucous patches. The absence of any other syphilitic manifestations in aphthous stomatitis is very characteristic, whereas we find syphilitic patches in the mouth to be always associated with some manifestation upon the skin, because, if the patient is not undergoing sufficient treatment to prevent syphilitic manifestations of the mucous membrane, these will be found invariably upon the skin at the same time.

Dr. Riethmüller. Will you give the differential diagnosis between smokers' patches and cancrum oris?

Dr. Roe. In smokers' patches there is a wide opaline line or discoloration of the mucous membrane which is more widely disseminated, but usually not as characteristic or well defined—in other words, not as well developed, not as

clearly grayish or opaline or defined. The discoloration is quite general; there is no superficial ulceration and no pain.

The case of the young woman spoken of, one of whose upper incisors exhibited marked absorption of the root, the patient suffering periodic pain and being relieved promptly and definitely by treatment, might be considered as one of hypersensitiveness to pain in a neurasthenic patient. In markedly neurasthenic or hysterical cases we must be careful to give the patient the benefit of the doubt that he is suffering an extraordinary amount of pain. I remember one patient who made a profound impression on me. He was a neurasthenic of the marked type, and in making a general examination I found the central incisor floating around in a mass of granulation tissue and extremely sensitive to touch. No one had evidently paid any attention to it, and, if the patient had called attention to it, it had evidently been disregarded. Upon extraction of that tooth the neurasthenia disappeared, and all evidence of mental aberration also disappeared, and the patient made an uninterrupted recovery to normal health. In some of these cases there may be marked nervous effects, from the highly overdeveloped activity of the nerve filaments producing neurasthenia of a marked type, hysteria, and in some cases possibly insanity.

Dr. SEIP. I move that a rising vote of thanks be extended to Dr. Roe for his paper. (Motion carried.)

Dr. SEIP. I move that Dr. Roe be made a corresponding member of the society. (Motion carried.)

Motion was then made and carried to adjourn until the Wednesday morning session.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

Forty-sixth Annual Meeting.

(Continued from page 1188.)

THURSDAY—*Evening Session.*

(Continued.)

The next order of business was the report of the Committee on Practice, by Dr. D. H. SQUIRE, chairman, Buffalo, as follows:

Report of the Committee on Practice.

By DANIEL H. SQUIRE, D.D.S., Buffalo, N. Y.

At the suggestion of your president it was deemed best to have the chairman of this committee edit the report, and make it as short and concise as possible.

The section of scientific research is left out altogether because, in order to present new material, it would have been necessary to impose upon the generosity of the Committee on Scientific Research, and at best such a report would only be a repetition and a needless waste of valuable time.

The chairman sent out letters to every teacher of operative and prosthetic dentistry in this country and Canada, asking them what in their opinion had been developed during the past year that would be of permanent benefit to humanity. Replies were received from the following gentlemen:

Edwin T. Darby, University of Pennsylvania; John L. Forbes; Harvey L.

Banzhaf, Marquette University; Edgar D. Coolidge, University of Illinois; E. E. Cruzen; W. E. Farris, Tufts College Dental School; Wm. P. Cooke, Harvard University; Clarence O. Wimpron, Washington University; Louis P. Hall, University of Michigan; Henry W. Morgan, Vanderbilt University; Austin L. Swift, New York College of Dental and Oral Surgery; H. M. Semans, Starling-Ohio Medical College: G. D. Laymon, Indiana Dental College; A. E. Webster, Royal College of Dental Surgeons; H. T. Smith, Ohio College of Dental Surgery; Wm. H. Porter; I. N. Broomell, Medico-Chirurgical College; Clyde Davis, Lincoln Dental College; Louis E. Ford, University of Southern California; Wm. F. Sharp, University of California; N. S. Hoff, University of Michigan; C. N. Johnson, Chicago College of Dental Surgery; G. S. Junkerman, Cincinnati College of Dental Surgery; F. H. Orton, University of Minnesota; S. H. Guilford, Philadelphia Dental College; B. Holly Smith, Baltimore College of Dental Surgery; Herbert L. Wheeler, College of Dental and Oral Surgery of New York; C. C. Allen, Kansas City Dental College; W. E. Cummer, Royal College of Dental Surgeons; A. H. Hipple, Creighton University; W. T. Chambers, Colorado Dental College; Alfred R. Starr, New York College of Dental Surgery; Chas. R. Turner, University of Pennsylvania; Geo. K. Thompson, Maritime Dental College, Dalhousie, Minn.; F. A. Ryan, Maritime Dental College; W. H. O. McGehee, Ohio College of Dental Surgery; H. E. Friesell, University of Pittsburgh; A. Hoffman, University of Buffalo; C. K. Buell, University of Buffalo; Ellison Hillyer, New York College of Dental Surgery; Donald M. Gallie, University of Illinois; Shirley W. Bowles, Georgetown University; H. B. Tileston, Louisville Dental College.

Their answers and those of the committee are tabulated according to their relative importance as received in the replies.

(1) *Operative dentistry.* (*a*) Prophylaxis, including pyorrhea alveolaris. (*b*) Synthetic cement. (*c*) Gold inlay. (*d*) Restoration of occlusal surfaces, tooth forms, and contact points. (*e*) Analgesia. (*f*) Radiography.

(2) *Prosthetic dentistry.* (*a*) Gysi articulator. (*b*) Williams' classification of tooth forms. (*c*) The Williams-Gysi artificial teeth. (*d*) Partial dentures retained by attachments—mechanical. (*e*) Green's method of taking inpressions. (*f*) Orthodontia.

(3) *Miscellaneous.* (*a*) The casting of aluminum dentures and of gold saddles as bases for prosthetic procedure. (*b*) Advanced work in plaster of Paris; the vulcanization of rubber as a contributing factor toward greater cleanliness. (*c*) Dr. Fischer's method of injection of novocain for local anesthesia. (*d*) Improvements in general anesthesia. (*e*) Removal of pus foci by extraction of teeth, by amputation of roots, and the refilling of pulp-canals. (*f*) The establishment of a bureau of research, revolutionizing the practice of dentistry. (*g*) The reorganization of the National Dental Society as improving the whole field of dental education. (*h*) Vaccines for the treatment of pyorrhea alveolaris. (*i*) Differential diagnosis of reflex pains in neuralgia of the trificial nerve. (*j*) Extraction of the four first permanent molars, between the ages of ten and thirteen years, as a prophylactic measure in the elimination of decay when the pulps of these teeth are exposed—this to depend upon the physical advancement of the patient. (*k*) Reconsideration of the etiology of dental caries and a new theory of caries susceptibility by Kirk. (*l*) The co-operation of the general surgeon and the dentist in the discovery and diagnosis of precancerous lesions in the mouth. (*m*) The use of high-frequency current in the treatment of inflammations about the mouth, especially in pyorrhea alveolaris. (*n*) The progress made in the attribution to the changing constitution of the saliva as a factor contributing to the cause of caries. (*o*) Thorough cavity preparation. (*p*) Cataphoresis. (*q*) Contact with the student body. (*r*) Pickerill's theory of dental caries.

It is the purpose of your committee to discuss briefly only those subjects which have received more than passing mention, taking them up in the order of their benefit to dentistry. It is hoped, however, that any of the subjects which are placed in the miscellaneous column may be enlarged upon in either the formal or the general discussion.

While the items referred to are mentioned as being of the greatest value to the general health of the body, it is understood that none of them is of recent origin, but their development may have reached a very high plane during the past year, and in that sense have exerted an important influence in maintaining health.

ORAL PROPHYLAXIS.

Systematic cleansing of the teeth and of the oral cavity by means of careful brushing and the removal of all deposits which may harbor bacteria is one of the chief essentials of preventive medicine. When such an eminent surgeon as Dr. Mayo of Rochester, Minn., says that "preventive medicine lies in the hands of the dentist," the true significance of a clean mouth is apparent.

The increasing knowledge of the injurious effect of laceration of the septal tissues during operative work has done much toward maintaining the health of the gums and the peridental membrane. This is a step forward in preventing those diseases which have their origin in this location.

PYORRHEA ALVEOLARIS.

While a great deal of advancement may be recorded for the past year in the treatment of this condition, the attention of the profession should be directed to one fact, namely, that when the teeth are practically denuded of their peridental membrane and have lost the rigid support of the alveolar process they should be extracted. Splints applied to such cases as an aid in maintaining the teeth in the jaw are a menace to the health of the patient. In other words, the retention of these teeth by splint work creates a vast surface of denuded membrane which is exposed to the ingress of infectious bacteria. Allow me to quote from Dr. Noyes:

It is important to remember that whenever the fibers have been stripped from the surface of the cementum, they can be reattached to it only by the formation of a new layer of cementum, building the fibers into it. This is certainly possible if the conditions are properly controlled, but the cells of the tissue must be in a normal and vitally active condition, and the surface of the root must be such that they can lie in physiological contact with it. The cure of a pyorrhea case, therefore, becomes a biological problem. In this connection it is important to remember that a surface of cementum which has long been bathed in pus may be so filled with poison that no cell can lie in contact with it and perform its function.

SYNTHETIC CEMENT.

The profession is more or less anxious in regard to the permanent qualities of synthetic cement as a filling material. It would seem that it is safe to use a reasonable amount of this cement in one's practice, but to exclude the other materials and to depend upon synthetic cement alone is not warranted at the present time. It harmonizes beautifully with the color of the teeth, and is especially favorably indicated in small cavities in the anterior teeth and in some very large cavities in teeth affected with senile decay; it is exceedingly important, however, to bear in mind the following:

(*a*) To thoroughly incorporate the powder in the liquid and to bring it to the proper consistence.

(*b*) To introduce it into the cavity in small pieces, until the anchorage grooves are securely filled.

(*c*) To use a short strip of celluloid —not more than one inch in length—in finishing.

(*d*) To allow the cement to crystallize thoroughly after its insertion, before coating it with paraffin and exposing it to the saliva.

(*e*) To finish the filling at a subsequent sitting.

COPPER CEMENT.

The colorless copper cement is an improvement over that which was made with the black oxid of copper, and in children's teeth, as well as in those of elderly people, the effect of this cement upon the tooth structure is of therapeutic value.

GOLD INLAY.

While the gold inlay is a valuable asset to the operator, yet this method should not be employed as a universal means of filling cavities with gold. In small approximo-occlusal, as well as in other cavities which are not large, the malleted gold filling is much more secure and of a higher grade of workmanship. The practical disuse of non-cohesive gold foils is to be deplored. It is of the greatest value in the form of mats or cylinders placed at the gingival seat of approximo-occlusal cavities, and in the shape of cylinders in filling small occlusal and buccal cavities, finishing the fillings in the former case with cohesive gold and in the latter case with or without cohesive gold foil. The method is rapid and the cavity is filled much more securely. There is a place for the inlay and a place for the malleted gold filling, and the operator who exercises judgment in the use of these methods will not meet with failure.

APPRECIATION OF OCCLUSAL RESTORATION.

The impetus which the essay by Dr. J. Lowe Young has given to dental operators in regard to the importance of anatomic restoration of oclusal surfaces has also done much in raising the standard of this class of operations, and in enabling the patients to masticate their food more properly. Some operators do not quite understand the application of this principle, because they attempt ideal occlusal restoration in mouths where the cusps are either much worn or entirely obliterated.

The correct anatomic feature in any case is one which harmonizes with the other teeth in the mouth. The full contour of the approximal surfaces with the properly made and placed contact point has been long recognized as an important factor in maintaining the health of the peridental membrane, and in enabling the patient properly to cleanse the teeth.

ANALGESIA.

The development of analgesia to a greater efficiency has been mentioned in the corespondence conducted by this committee. Upon inquiry in regard to the practical use of analgesia, the writer was informed that it is satisfactory in about five per cent. of cases. This would seem to be a rather low percentage, but by improved methods, we may some day be able to eliminate much of the pain connected with dental operations.

RADIOGRAPHY.

It is of vital importance that the profession should have the opportunity to use radiography to assist and verify the diagnosis of disease conditions. At the present time it is principally used by physicians, and the fee charged to dental patients is the same as that for a consultation—viz, ten dollars—for each radiograph. For the average dental practice this expense is prohibitive. It has occurred to the writer that if the colleges of this state would do such work for the profession in the districts in which they are located at a nominal price of two or three dollars per exposure, the situation would be relieved somewhat.

The necessity for the co-operation of the surgeon and the dentist in the early diagnosis of malignant diseases is being more fully recognized. In this relationship the dentist has the opportunity of performing the greater service to the patient, viz, that of calling the attention of the individual to the condition before it is too late. The awakening of the profession to a realization of the susceptibility of the body to infection through neglect of chronic alveolar abscesses, open root-canals, and deep pyorrhea pockets about the necks of teeth has done much for the general health of the laity.

PROSTHETIC DENTISTRY.

The Gysi articulator. This instrument was so thoroughly discussed at the last meeting of this society that it needs only a word of commendation by those who have studied its merits. It is a revelation of accuracy in reproducing the various movements of the jaws. We shall not take the time to go into further discussion of its worth; it has been proved that a great advancement has been made in the construction of artificial dentures through the development of this articulator. The Gysi Adaptable is suited to the use of the thoughtful practitioner who is willing to devote sufficient time to master the manipulation of its parts.

Dr. Williams' classification of teeth. This theory has completely upset all previous ones in regard to the classification of the natural teeth and the manufacture of artificial substitutes.

Dr. Williams has undoubtedly proved that there is no such thing as temperamental forms of teeth; that there are no racial types of teeth; that nature does not always produce teeth which harmonize with the features and the face; that a scientific and artistic system of artificial teeth cannot be produced by copying sets of natural ones; and that there are three typal forms of incisors, as follows:

Class 1, characterized by parallel or nearly parallel lines which represent the proximal surfaces of these teeth for half or more than half of their length from the incisal edges.

Class 2. The parallel lines converge so markedly that they would meet in most instances at a point near the end of the root.

Class 3. This is known by a delicate, double-curved line on the disto-proximal surface and sometimes, though less frequently, on the mesial surface. All of the angles and surfaces of this class are more rounded and graceful.

"These primitive forms of teeth," says Dr. Williams, "are the same in different races, and this proved fact not only disproves a racial type of tooth, but it proves beyond question that there is no such thing as a temperamental type."

After an exhaustive study of the teeth of many skulls of nearly all races, even going back to the Bronze age, Dr. Williams makes this statement in regard to the harmony of the teeth and the face: "It would probably express an important truth to say that Nature always seems to be striving to reach or realize harmony, but rarely achieving a perfect success and sometimes going very wide of the mark." And again, "Any given forms of teeth are not peculiar to any race, neither do they bear any necessary relation to the shape and size of the skull. In all races there is community of typal tooth forms."

Williams-Gysi artificial teeth. Permit me to quote again from Dr. Williams' paper in order to show the underlying principles which inspired the creation of the Truebite anatomic molds: "While all art must be founded on the most intimate, penetrating, and thorough study of nature, that it may be true to life, yet truth to life means much more than an indiscriminate consideration and an acceptance of a mere welter of facts. It means the appreciation and understanding of the relative value of facts and the power or faculty of discriminating between what is of small value and what is important, relevant, and fine—all that is really vital to the subject."

Dr. Williams declares that there are comparatively few forms of artificial teeth required, because there are only a few types of human faces. "The aim in designing artificial teeth should always be to maintain character in the tooth by keeping its typal or class features dominant. The object is to establish harmony between the outline or form of a tooth and the outline or form of the face. If the lines and curves of the tooth balance or are in harmony with the lines and the curves of the face, the highest degree of perfection attainable has been reached. The application of the three typal classes of teeth to the three types of faces are thus a harmonizing blending of the two."

Some of the features of the new molds. The enamel markings on the labial surfaces diffuse the light and soften and enhance the appearance of these teeth.

The tiny horizontal striations prohibit the reflection of light in solid blocks, thus softening both the high lights and the shadows. The occlusal surfaces of the bicuspids and molars which are designed by Dr. Gysi are so formed that the food is properly prepared by a triturating force of from 15 to 20 pounds. Professor Gysi has also joined the two bicuspids and the two molars on each side in the form of a single block. The compensating and lateral curves are accurately worked out in the occlusal surfaces of these blocks, so that their antagonization in full sets is very simply made.

Classification of the human face. Class I comprises the square type of face, in which the sides are parallel or nearly so, and in which the curves at the angles of the jaw are so abrupt as to give the face a square appearance. This type of face, with its variations in length and width, harmonizes with the outlines of the teeth of class I. Class II is the pyramidal or tapering face, in which the forehead is very broad, with the outlines of the face converging toward the chin; the class II molds are especially adapted to this type of face. Class III is the ovoid face, which has the greatest width in the lower part, the outline frequently exhibiting compound curves; the class III mold is designed for this type of face.

Partial dentures retained by attachments—mechanical. The profession is slowly but surely abandoning the practice of inserting large pieces of bridge work. The partial denture with a palatal or a lingual bar, held in position by some removable attachment, as designed by Gilmore and others, had proved itself to be just as serviceable and much more hygienic. In cases where the roots must be made parallel to receive attachments the parallelometer designed by Dr. Chayes is indispensable.

The Green method of taking impressions. This method differs from those heretofore in vogue in the following respects: Small trays of aluminum with removable handles are used instead of the large, heavy trays. The trays are trimmed to clear the muscle attachments of either jaw from one-eighth to three-sixteenths of an inch or more, so that the tray cannot interfere with the pressing of the impression compound against the ridges; the tray is then filled with one-third or one-half sheet of impression compound. In the upper tray the compound is heaped high in the center, in the lower it is laid on the tray in the form of a roll of about the size of a lead pencil. The loaded tray is passed into the mouth, pressure being exerted at right angles to the surface, held in the mouth until the compound has cooled, then removed, chilled with water, and the excess of compound, if there be any, is trimmed away.

The muscles are made to conform to the periphery of the impression as follows: The outer border of the impression is heated to a slight degree over a dry flame, passed into hot water, thence quickly into the mouth. The patient should then be instructed to move the lips in every direction possible, thereby shaping the softened surface to conform to the pressure of these muscles.

The heel of the plate may be forced to lie tightly in contact with the palate by heating the margin slightly and returning the impression to the mouth, and while holding it firmly in position, the pliable margin is forced against the roof of the mouth by a wiping pressure with the index finger.

ORTHODONTIA.

The new expansion arches devised by Angle allow periods of rest between the movements of the teeth. The patient does not need to appear for treatment as often as formerly, and the improvement in the making of these orthodontic appliances has reduced the liability to caries during treatment to a minimum.

THE SALIVA.

This most important subject will no doubt be fully discussed in the report of the Committee on Scientific Research, and, in passing, this committee most heartily commends the excellent work

which is being done by Professor Gies and others in determining its influence upon the inception of dental caries.

Respectfully submitted,
DANIEL H. SQUIRE, *Chairman,*
FRANK F. HAWKINS,
WILLIAM J. LEDERER,
Committee.

Discussion.

Dr. W. S. ROSE, Schenectady. Although the report of the Committee on Practice came into my hands but yesterday, I have had it long enough to note that it is an unusually able and accurate report of those features which are receiving the attention of the leaders in dental practice. This is assured by the communication of the Chairman with forty-two of our dental college teachers. The fact that twenty-nine topics are cited in their replies gives us some idea of the vast extent of our efforts. If forty-two other leaders outside the colleges had been consulted, there would doubtless have been a liberal addition to the subjects for consideration.

I am glad that this report concerns practice instead of theory; not that the latter is not important, for I believe the topic cited by one correspondent, "The Establishment of a Bureau of Research," is the most gratifying fruit of our newly consolidated organization, to be not eclipsed in importance by any other phase of our professional activities. But what we need as a profession is the emphasis of the importance of *practice* rather than *preaching.* There are so many dental journals and so many ambitious dentists, whose literary productions need encouraging but whose efforts from a scientific standpoint are utterly insignificant when compared with the demonstrated achievements of our great men—Black, Miller, Gysi, Snow, and others. So much is being written that the rank and file of dentists, who are busy practitioners, too busy to read all the essays that appear, become confused as to which is the important and proved, and which is the speculative. Not long ago some dentists at a district meeting were discussing the insertion of amalgam, and a number of the members recommended the plan of burnishing amalgam into the cavity, when for the last decade no practitioner who has been regarded as sufficiently proficient in the use of amalgam to place a set of instruments on the market has included an amalgam ball burnisher in his set.

Notwithstanding the fact that Miller settled for all time to come the cause of the so-called erosion at the necks of teeth, and demonstrated that the responsibility for these defects lies with the powder and brush; notwithstanding the fact that no one has ever seen a case of erosion in neglected, unbrushed teeth, papers are still being written reviving this question and discussing the etiology, by men who have never even read Miller's discourse on the subject.

Although for more than a decade no writer bold enough to place a text-book upon the market has advocated any other method of cavity preparation than that evolved by G. V. Black, there are still good operators who regard the disciples of his scientific methods as mere faddists.

When such men as Dr. Mayo, whom Dr. Squire quoted, admit and assert that "preventive medicine lies in the hands of the dentist," it surely behooves us to so classify our achievements and standardize our accepted methods that we are at least ready in the cause of humanity to utilize the conquests that cost our scientific investigators so much. If there were monetary conditions attached to their use, we would contest the validity of the royalty, and proceed with their use until the case were settled.

Although the report of the committee is short, it is full of meat. The paragraphs dealing with pyorrhea alveolaris and the elimination of oral septic foci show that good work is being done to eradicate the stigma attached by medical men to our efforts. It seems that the time has arrived when those dentists who do not believe in fighting these conditions are limited in number. I want very much to hear an epitome of the results of the experiences encountered in the use of synthetic cements. I know some patients who prefer it to porcelain

at the same price. It certainly lends itself beautifully to the selection of perfect color.

The regret of the committee that soft foil is not used as much as of yore is apparently being shared by most good operators. More clinics demonstrating its use have been given of late than formerly. Certainly the dentist who does not use soft foil is doing himself the greatest harm imaginable.

I should like to hear a great deal about analgesia. I believe the essayist underestimates considerably the percentage of success in its use.

The paragraph on radiography is to the point, and has one's ready indorsement.

The part of the report devoted to anatomical occlusion and forms of teeth, as well as impression taking, deserves special commendation. I never could learn the directions as to temperamental forms of teeth, and now I am overjoyed that this classification has been found unreliable.

The brief description of the Green method of impression-taking is very valuable. It seems that, after a good impression has been taken, some improvement should be noted when it is duplicated in the denture. Every dentist has replaced an impression in the mouth, pulled with considerable effort in order to dislodge it, and then was saddened by the thought that the finished denture would be dislodged by less than one-half that effort. Have any marked results been obtained by the use of the approximate metal forms now on the market?

Dr. W. A. Price, Cleveland, Ohio. I am glad to have heard the report, which I consider to be one of the best summaries on the present status of our professional work, particularly with reference to research work.

I am unable to enter into a discussion of this subject without becoming so enthusiastic that I might embarrass this occasion. I particularly want to emphasize that portion of the report which recommends more exact knowledge. I think I voice the sentiment of every man here when I state that the greatest need of dentistry today is truth.

Dr. C. N. Johnson, Chicago. I had no idea of taking any part in the discussion of this excellent report, but it is a great pleasure to commend it and to signify my approval of its salient features. There are just two subjects that I want to refer to briefly, if I may, and if I misquote the report I should like Dr. Squire to correct me. The report speaks of analgesia. That seems to be the prominent subject before the profession at this time, and I think Dr. Squire made the statement that, judging from the report referred to him, about five per cent. of cases were supposed to be successful. Is that correct?

Dr. Squire. Yes.

Dr. Johnson. I believe that part of that five per cent. is successful in the mind of the operator and the patient rather than from any virtue of the process. [Applause.] I do not want to appear iconoclastic, but I have been sufficiently long in the profession to see many innovations introduced which met with enthusiastic reception at the moment of their introduction, but after calm deliberation as to results, we have usually returned to the old methods of practice, and dropped many of these new fads. I want to make a statement here lest I may be misunderstood in some of the remarks I wish to make. There is no member of the profession who has greater respect for the sensitivity of the patient than I. No man could go farther than I to alleviate suffering in the dental chair, but I do not believe that analgesia is the best way to meet the situation. I do not believe that all of the discomfort experienced in the dental chair is physical. The pain we inflict upon patients is of such a character that it is necessary to render the patient insensible or partially insensible to accomplish the results we are called upon to accomplish. And, in my belief, the introduction of any such means is demoralizing to the profession. If we treat patients with kindness—I know this is old, but it is admirable nevertheless—and impress

them that we are trying to minimize their discomfort, they will meet us halfway and tolerate any reasonable measure of discomfort. The profession should not foster in the patients' minds the idea that, when they come to the dental office, they need not have some stamina to tolerate the operation. The principal pain that we cause to patients is in the preparation of cavities, but my patients complain of other operations as much as of the preparation of cavities. The application of the rubber dam, the buzz of the engine, the polishing of fillings—all these necessary procedures jar on their nerves as much as the preparation of cavities, and if a cavity is so extremely sensitive that we cannot adequately prepare it for a permanent filling, I believe the best service will be rendered by the insertion of a temporary filling, oxyphosphate if you wish. It would be a mistake, of course, to dismiss the patient with the idea that the filling is permanent; on the contrary, a time should be specified for his return, when the operator will be able to make a preparation that will not be irksome to the patient at all. [Applause.] I do not want to discourage any effort to alleviate suffering, but I have had experience with patients who came from practitioners who have impressed the necessity for humanitarian dentistry on them, and in nearly every case these were the most nervous patients, and the most difficult to deal with. Their fear had not been eliminated by analgesia or cataphoresis, as practiced quite extensively a few years ago. I do not believe in inflicting any more pain than is necessary, but we should develop that particular stamina in our patients which enables them to withstand the discomforts incident to legitimate practice, and not develop that dependence which makes patients come to the office and ask for narcotics every time they take the chair. I do not believe that it is well for the tissues from a physiological point of view to carry them to the point of insensitivity by means of an anesthetic and to keep them in that condition, for even half an hour.

Reference has been made in the report to the advocacy of the extraction of the first permanent molar under certain conditions.

Dr. Squire. That procedure was advocated by one of the correspondents quoted in the report; it was not advocated at all by the committee.

Dr. Johnson. I did not believe that with the present enlightenment upon the importance of the first permanent molar, any practitioner could still advise its extraction. To my mind, the first permanent molar is the most important tooth in the whole arch, upper and lower. [Applause.] There is no other tooth which so securely maintains the arches in normal relation to one another. I have examined a great many models, but have never seen one in which the occlusion was normal after the extraction of the first permanent molar. I believe we should preach this in season and out of season to the young man coming into the profession. We may not be able to reform the old practitioner, because he is set in his way and I respect his way no matter what he does, but upon the young men we should impress the fact that that tooth above all others should be preserved in the arches in order to insure normal occlusion. That message must be carried not only to the profession but to the public at large. No practitioner should give a public lecture without emphasizing that fact, so that the mothers will be able to recognize the first permanent molar in the mouths of the children, and be sure that it is preserved. I need not go into the reasons why it should be preserved, but I never like to see even a reference made by a dental practitioner as to the advisability of its extraction.

Dr. C. F. Ash, New York. It had not been my intention to take any part in the discussion of the report, but I feel I should be doing less than my duty if I failed to make some remarks just now. Dr. Price has said that what our profession is seeking for is truth in dentistry, and it is with that statement ringing in my ears that I feel impelled to make reply to part of the discussion made by Dr. Johnson. I know that it requires

a good deal of temerity to take issue with any statement on any phase of the practice of dentistry by so eminent a man as Dr. Johnson. What I wish to say concerns the question of analgesia. I was impressed with the report made by your committee, viz, that possibly five per cent. of the analgesia operations are successful. I was surprised at this small percentage, and I was still more surprised by Dr. Johnson's subsequent remarks. Dr. Johnson said that he was heartily in sympathy with any effort to alleviate pain, but stated that, in his mind, it was detrimental to the tooth physiologically and to the mental condition of the patient to give the patient an anesthetic. It may be that the period within which nitrous oxid and oxygen has been used has been so short that we are not prepared to say what the physiological and mental effects may be. It may require some years of development to discover that there is a detrimental effect, but I must say that up to this period I have been unable so far to detect any detrimental effect either mentally or physically upon any patients upon whom I have used this anesthetic in my office. I feel sure that Dr. Johnson's experience is based not upon his own efforts but upon those of other practitioners who have been unsuccessful with nitrous oxid and oxygen analgesia.

My experience with cataphoresis some years ago was not altogether a happy one. I had a cataphoric apparatus and used it quite extensively until I felt that, in my hands, it was not satisfactory, and I discarded it. From my own experience I felt certain that the administration of nitrous oxid and oxygen is satisfactory in the hands of some practitioners at least, and I do not pretend to be specially capable in manipulating the anesthetic. Patients are relieved of a great deal of anxiety and pain by analgesia, and some operations which formerly I could not perform without some other anesthetic are possible with this method. I do not use it on every patient, any more than I perform the same operation upon every patient, but restrict its application to cases in which I expect the pain to be so great as to warrant the use of some analgesic. These remarks are not made in a spirit of antagonism to either Dr. Johnson or the committee, but simply in the interest of truth. [Applause.]

Dr. Henry W. Gillett, New York. Having discussed the report of the Correspondent a year ago in regard to the radiograph, I want to say a word upon this subject, as it has been referred to in this report. Another year's experience has confirmed my position and views; so much so that I am now even a stronger advocate of the constant use of the radiograph in the dental office than I was then. I believe that it is more essential in dentistry than in any other branch of the healing art for the operator to have an X-ray apparatus in his office where he can make use of it at will during the progress of operations. Reference was made to the expense. I deplore the fact that the question of expense in that connection has been raised here as elsewhere. Perhaps I am influenced by a report which recently appeared in the Dental Cosmos of the remarks of a member of this society, who was evidently referring to my discussion of a year ago, and who, in my opinion, assumed a somewhat unfair view. Possibly he was joking when he suggested that the practitioner who used the radiograph to the degree that I advocated a year ago was possibly doing it because of the money returns in it. It seems to me that this is not the right attitude. The point of my argument was that the patient receives much more than the equivalent value of the added expenditure incident to the use of the radiograph by the much greater value of the service received. One of our New York practitioners who has been making use of the radiograph in his practice for several years has reported recently that careful analysis of the expenditures connected with that work shows that radiographs in his office cost twelve cents apiece, exclusive of the expenditure of time. It is coming to be the opinion of many men who use the radiograph freely that it is not wise or

fair for the general practitioner of dentistry to charge specialists' fees. I may say that some of us are charging a fair fee for the first radiograph, but make no further charge for radiographs of the same tooth, regardless of whether it is radiographed once or twenty times; others are adopting modifications of that plan. In my estimation, the question of the fee of the specialist in radiography does need to be raised here. The fee that is fair in a large city is unfair in a smaller town where expenses are much less. But regardless of the amount of the fee, there is an equivalent value for the patient to be gained by the use of the radiograph, and this value is often much greater than the expenditure. I want to reiterate my statement made last year with regard to the importance of the radiograph in dental practice, viz, that no man who desires to practice dentistry on the highest plane can afford to dispense with the constant assistance of the radiograph.

Dr. SQUIRE (closing the discussion). I shall only say a few words in closing this discussion. In regard to the synthetic cement, I think the letter I received from Dr. Darby expresses the idea quite clearly. He said, "We do not know just what to say about synthetic cement. . . . . While it is a beautiful filling material, I think we should go carefully, and work out our own salvation."

The extraction of the first permanent molar, which Dr. Johnson spoke about, was neither recommended nor indorsed by the committee; it was simply one answer I received from a gentleman connected with one of the leading colleges of the country in regard to what he thought was the correct method. He stated further that he would in the future demonstrate to the profession by means of a great number of models that his contention was correct. We have simply reported this man's opinion for what it is worth.

The expense of radiography was spoken of, because in Buffalo they charge a consultation fee of ten dollars. As many of us know, that price in a great many cases is simply prohibitive. I realize the importance of this method of diagnosis in general practice, but many times when a patient has to be subjected to four or five, and possibly more exposures, the price of ten dollars for each radiograph is unreasonable. If one owns an apparatus, I appreciate the fact that the expense is little, but it is difficult to induce practitioners who are located in small communities to buy an outfit. Therefore I wish that some means could be devised to place such outfits in their hands, and that was the object of the committee's reference to this topic.

Dr. Smith next introduced to the society Dr. WESTON A. PRICE, Cleveland, Ohio, who addressed the meeting in regard to the work of the Scientific Research Commission of the National Dental Association.

The society then adjourned until Friday, at 2.30 P.M.

(To be continued.)

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Devoted to the Interests of the Profession.

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PHILADELPHIA, NOVEMBER 1914.

EDITORIAL DEPARTMENT.

WILL THE DENTAL PROFESSION TAKE "THE NEXT STEP"?

THE period of matriculation in the great majority of American dental colleges has closed, and from the sources of information at present available the indications point to an exceptionally large student registration. Whatever may in local instances have led to this result, it is probably true that the disturbed European conditions and their reflex impression upon American business activities have been a factor in increasing the number of admissions to dental colleges—for it has always been observed that unsettled economic conditions tend to direct the attention of men toward professional pursuits. Various other contributing factors are to be noted, especially the greatly increased public interest in and attention to dental hygiene and the recognition of oral hygiene as a prerequisite for sound bodily health—a recognition that more and more is being practically translated into a

larger demand for dental service. The further extension and intensification of this widespread and practical interest upon the part of the public in the care of the mouth and teeth must inevitably enlarge the demand for dental service. The vital question growing out of the situation as above outlined is, How will this public service demand be met by the dental profession?

Throughout the remarkable development which dentistry has made in the past two decades, and particularly during the last ten years, the old curriculum—embracing a training of three sessions of seven to nine months each in three separate years—has continued to be the standard of time required of the student in order to fit him to practice dentistry, notwithstanding the fact that the data with which he ought to be familiar have increased to such bulky proportions that it has now become physically impossible for him to study, much less assimilate, more than a respectable fraction of it. "The curriculum is overcrowded"—that everyone who knows acknowledges; but to say that it is "overcrowded" is putting it mildly. The overcrowding has proceeded to a point where it has become physically impossible to educate the budding practitioner to a point of efficiency that will enable him to practically do his part in taking that "next step in preventive medicine" which Dr. Charles Mayo has prophetically stated ought to come from the dental profession.

More time is needed in order to set before the student the things about dentistry that he ought to know, and more time is needed to enable his mind to grasp and assimilate that which ought to be presented to him.

"Well! it's up to the colleges." But is it? Exactly that attitude upon the part of the dental profession constitutes the essential obstacle to the greatly needed advancement in dental education in the matter of a lengthened and enlarged dental curriculum. A previous attempt upon the part of the colleges to establish a four years curriculum met with disastrous failure because the movement lacked a practical and united professional sentiment in its favor. The standards of professional sentiment with respect to dental education are expressed in the statutes of the several states defining and governing the practice of dentistry therein. No school can successfully maintain a four years curriculum when the state laws will grant a license after examination

to any applicant who has graduated from a school requiring only a three years curriculum. Reduced to its lowest terms, the state laws have thus far backed and supported the position of the short-term schools, and left those in the advance guard to shift for themselves.

The solution is obvious. The majority of dental educators today recognize the need of a four years curriculum. When the dental profession wants to advance its standards of professional preparation it can do so by so amending the state dental laws as to require graduation from a four years curriculum as a prerequisite for the dental licensing examination.

There is nothing obscure about the case; it is clearly "up to" the dental profession, and, in this fundamental matter, as Dr. Mayo has asked, Will the dental profession take the next step?

REVIEW OF CURRENT DENTAL LITERATURE.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Zahnaerztliche Orthopaedie und Prothese*, Munich, May 1914.]

BAD HABITS AS AN ETIOLOGICAL FACTOR, AND THEIR TREATMENT. By Dr. W. Jessen, Strassburg.

In children we frequently find habits which, in the course of time, bring about considerable changes in the jaws and numerous irregularities. A large percentage, in fact, of all irregularities can be traced to these habits. Thumb-sucking produces the characteristic deformity in which the upper incisors are moved considerably outward, while the lower incisors form a straight line or even a concave arch. Sucking of several fingers at once produces a similar effect, the upper incisors protruding considerably, while the lower are tipped lingually or crowded out of alinement. During the first year of life, thumb-sucking is of no consequence; after that age, however, it must be stopped at any cost. During the daytime this habit can be combated by continuous watchfulness on the part of the parents. Upon falling asleep, however, the children will generally persist in their habit. Wrapping the hands, the use of mittens, etc., are irritating to the child, induce restlessness and crying spells, and disturb the night's rest for the child as well as for the parents.

Jessen suggests as the most effective preventive a stiff wire skeleton shaped like a sleeve, covered with some suitable fabric and fastened by loops to buttons on the child's dress or nightgown. These sleeves leave the child the use of his hands, yet do not permit them to be raised to the mouth, as the elbow cannot be flexed. The younger the child, the easier it will be to break the habit and the shorter the time during which the sleeves need be worn. The writer's own children were weaned from their habit in three weeks.

During their school studies, older children form the pernicious habit of biting penholders, biting the lower lip, or pressing the upper

incisors against the lower lip. Orthodontic treatment of the deformities thus created is useless unless these habits be first broken, which can be accomplished only by the parents' unrelenting supervision. Jessen also describes a case of pronounced lower retrusion in a seven-year-old child produced by the extension bandage treatment for curvature of the spine. Similar cases have been described in COSMOS for January 1913, "Deformity of the Jaws Caused by the Extension Bandage in the Treatment of Spondylitis," by Dr. G. Lind; and in COSMOS for December 1913, "Deformities of the Jaws Following Treatment for Spondylitis," by Dr. O. Treymann. In Jessen's case, orthodontic treatment, continued for one year, brought about a normal occlusion and also marked improvement in the child's general health.

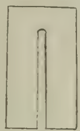
[*Zahnaerztliche Rundschau*, Berlin, June 28, 1914.]

A MEANS FOR WORKING STEELE FACINGS. BY ZAHNARTZ NEUBAUER, FRIEDENAU.

Pinless teeth for metal plate work have in recent years become very popular. For working Steele teeth the writer describes a contrivance designed by L. Bub of Hamburg, consisting in a T-shaped plate-rail of 18-karat gold (see Fig. 1) which fits into the slot

FIG. 1.

FIG. 2.



of Steele facings. It is only necessary to grind the facing to fit, to cut a piece of plate-rail of proper length to fit the groove in the facing, and to proceed to make the backing, into which a groove corresponding to the thin portion of the plate-rail is cut with a fine and sharp flat file (see Fig. 2). After the adjustment of the facing is made, it is removed, and the backing and plate-rail are soldered together with 18-karat solder, the facing is replaced on the plate-rail, and the adaptation of the backing to the facing is finished, the entire operation requiring not more than ten minutes. Besides economy in time, this method offers the advantage of a saving in gold.

[*La Stomatologia*, Milan, April 1914.]

CHRONIC HYPERPLASIA OF THE PULP. BY DR. G. FASOLI.

After reviewing the etiology and clinical picture of chronic hyperplasia of the pulp, for which no specific micro-organism has so far been discovered, Fasoli proposes to divide this form of pulpitis into one of granulomatous and one of sarcomatous character. In a case of chronic hyperplastic pulpitis of the lower left third molar, he found upon microscopic examination a small, round tumor connected by a peduncle with the inflamed coronal portion of the pulp, which was exposed upon the lateral aspect of the pulp chamber. This tumor represents a neoplasm of secondary cementum resembling osteoid tissue, and under high magnification exhibits four layers of different tissue, viz, secondary dentin, irregular tissue in place of the destroyed odontoblastic layer, a broad layer analogous to dentin with typical bone cells encapsulated and with long processes, and pulp tissue which, strange to say, was entirely normal. The inflamed polypoid growth consists of strata resembling osteoblastic tissue and deep cells permeated by strands of connective tissue. As to the etiology of the secondary cementum observed, Fasoli ascribes its formation to the invasion of connective tissue elements of the periosteum, which may enter either through the enlarged apical foramen or through accessory canals. The conservation of such teeth is possible.

The writer's highly scientific deductions are illustrated by a beautiful colored plate.

[*Journal of the Allied Dental Societies*, New York, June 1914.]

SECONDARY INFECTIONS HAVING THEIR PRIMARY ORIGIN IN THE ORAL CAVITY. BY DR. T. B. HARTZELL.

Hartzell demonstrates that the mouth is the constant habitat of many destructive organisms, and offers the best culture medium possible for their growth. Animal passage or passage of a micro-organism from one living being to another keeps these organisms in a constant state of change, exalting or depressing their pathogenic possibilities, dependent

upon whether the living being to which they are transferred is relatively highly immune or has no immunity. Animal passage is being made by these pathogenic bacteria. They gain entrance into the mouth by the following means: The inhalation of the dust of streets and living rooms, foods, fruits, drinks—milk and water—finger-tips, kissing, use of common drinking-cups, etc. The constantly changing reactions of the mouth from alkaline to acid favor transmutation as well as animal passage, in that they inspire exalted activity on the part of the micro-organism. Oxygen tension is always reduced just in proportion as the micro-organisms find their way into root-canals and pyorrheal pockets, thus rendering possible such changes in the organisms as will induce them to attack one tissue or another. Clinical observation is responsible for the belief that almost every individual who reaches manhood or womanhood has one or more blind dento-alveolar abscesses, and that these abscesses and pockets contain streptococci among other organisms. Ninety per cent. of people present lesions which range all the way from a mild gingivitis to deep blind pyorrhea pockets around their teeth. Tooth-root surfaces in pyorrhea pockets are always more or less coated with living micro-organisms constantly ready to make incursions either into pulp chambers or into the tissue surrounding the roots, where entry into the circulation is rapid, easy, and constant. It is the constancy of this invasion which eventually breaks down immunity.

[*Oesterreichische Zeitschrift für Stomatologie*, Vienna, No. 3, 1914.]

A METHOD OF MIXING AMALGAM. By ZAHNARZT E. RUDOLPH, Berlin.

The changes in the volume of amalgam are caused by the method of preparing the cavity, the technique of inserting the material, the quality of the alloy used, and above all, the proportion of mercury employed in mixing the amalgam. This proportion is a definite one, but is disregarded by most practitioners, who merely guess at it—a most unscientific procedure. Too much mercury impairs the quality of the amalgam filling. It is detrimental to press out the excess of mercury, since in doing so the constituents soluble in mercury, among these the noble metals, are removed from the amalgam. No definite law can be formulated concerning the proportion of alloy and mercury, different alloys calling for different treatment. For this reason the scales which have been offered in the market are not satisfactory. The writer has constructed an adjustable proportional scale, which can be regulated at will so as to enable the operator to weigh out the proportions proper for the alloy used. In this way an economy in mercury and alloy is effected, and the amalgam does not come in contact with the hands. These proportional scales also enable the practitioner to control the uniform quality of a manufacturer's product, and the mixing can be left to the assistant.

[*New Zealand Dental Journal*, Dunedin, March 1914.]

AN INVESTIGATION INTO THE CAUSES OF IMMUNITY TO DENTAL DISEASE IN THE MAORI OF THE UREWERA. By DR. H. P. PICKERILL AND PROF. S. T. CHAMPTALOUP.

Pickerill gives the results of investigations carried on under very great difficulties, among young Maori natives in the Urewera country, since he found that a considerable number of the adult natives had been out of the district on visits to civilized parts on one or several occasions. The principal diet of these people, which is not identical with that of their ancestors, consists at present in riwai, kumara, rotten maize, pork and mutton occasionally, all cooked very soft. They are fond of wild fruit, and consume considerable quantities of European flour, tea, and sugar as long as the small stock lasts. They have all adopted European garments, and live in very airy and clean huts made of roughly split pine slabs. On the outskirts of the country the tubercle bacillus is reaping a rich harvest. All the films (fifty in number) made were from perfectly healthy mouths, both as regards teeth and soft tissues, in children between the ages of four and fifteen. The varieties of organisms isolated by cultivation were found to be for the most part those least in evidence in the smears made directly from the mouth, and proved to be precisely similar to what one might expect to find in swabs from individuals in an ordinary civilized community. As the writers' conclusions

were based on swabs examined long after they had been taken, they were considered very unreliable, and it was decided that, if detailed work was to be done, it would be necessary to have a bacteriological equipment on the spot—a matter of considerable difficulty and expense, owing to the inaccessible nature of the locality. Yet there was quite sufficient evidence to show that immunity to caries and oral infections is not due, in these children, to the absence of those organisms which are usually regarded as causal factors in such conditions.

On a second visit as full a laboratory equipment as possible was taken, and again fifty perfectly immune children were selected, the general findings being as follows: As regards the saliva, the alkalinity per cc. was not apparently much in excess of what is usually found in civilized children, but the rate of flow was very markedly in excess—from four to six times as great. All salivas were acid to phenol-phthalein, and alkaline to methyl-orange. The ptyalin content was in all cases low, but the ptyalin index (ratio of content to flow) was more than double that of susceptible children. The sulfocyanate content of the saliva was in every case very low. The highest obtained was 0.0035 per cent.; in 22 per cent. of the cases it was absent entirely, and in others there were only faint traces which could not be accurately measured. The viscosity was by no means low; it is probably in excess of what is found in the saliva of susceptible children. In every case, a marked acid reaction resulted from the incubation of biscuit detritus, varying from 0.25 to 2.0 cc. $\frac{N}{50}$ NaOH. Glucose broth was in every case rendered markedly acid, —2.0 to 5.0 $\frac{N}{50}$ NaOH. The bi-palatal measurement (M to M) was in all cases high—from 35 to 40 mm.

The bacteriological examination confirmed the report of the first visit, viz, speaking generally, Gram-negative organisms predominated. It seemed that in the salivas there were perhaps more organisms present than one would expect to find in a normal healthy European saliva, and that in the gingival deposits there were on the whole considerably more thread forms and spirochetes than are usually seen in similar preparations from the mouths of Europeans. Large diplococci were observed in most cultures; these did not form acid on the Petri dishes. The gelatin liquefaction test showed that the mixed organisms in the mouths of immune Maori children had eight times the peptonizing power of those found in European susceptible mouths. The mouths, including the tongues, were in all cases beautifully clean, the teeth regular, and the arches wide; yet their hardest food was boiled riwai or kumara, and cooked Maori bread, with tough, rubber-like crust, with occasionally a scrap of pork or mutton. The teeth were white and well formed; in no case could the imbrication lines be detected with the naked eye. Caries, when present in the other children, was found to be almost entirely confined to the younger ones, and in them to the deciduous teeth. This may possibly be a sign of the more recent encroachment of civilization, which the elder children have escaped.

[*Zahnaerztliche Rundschau*, Berlin, May 24, 1914.]

EYE LESIONS IN DENTAL PRACTICE.

By Zahnarzt Salomon, Posen.

The writer cites as a warning example the sad case of a colleague who lost both eyes from an infection which was caused by the accidental lodgment of a flying root fragment in his right eye in the course of the resection of a necrosed maxilla, and which, despite the immediate prophylactic application of protargol, spread to the other eye.

It happens frequently enough in daily practice that foreign bodies reach the eye. The prognosis in all eye lesions caused by accidents in practice depends upon the question whether the wound is infected or not. Several days, however, must pass before it can be determined with certainty whether the eye has really been infected. If the wound is aseptic, the eyeball can always be saved provided proper treatment is instituted. If the wound is infected, however, the prognosis is very serious, and it is only by means of most energetic therapeutic measures that the eye can be saved. Frequently enough the whole eye suppurates, severe pains, edema of the lid, and exophthalmus supervene, the clinical picture being that of panophthalmus. Frequently a sympathetic inflammation of the

other eye sets in, and after removal of the primarily affected eye, the other also is lost.

As a protection against these tragic accidents, protecting spectacles of wire netting, strong glass, or celluloid should be worn during extractions, scaling, and similar operations. If the eye is injured, the fresh wound is rinsed with 3 per cent. boric acid solution, sublimate 1 : 5000, or a very dilute solution of potassium permanganate. Subacetate of lead solution is contra-indicated, as it may cause irreparable lead incrustation in the injured cornea. Until an ophthalmologist can be consulted, the eye should be protected by a bandage exerting light pressure, as every wound is irritating, and continually invites wiping or rubbing with the fingers, whereby infection might be introduced. Morgenroth and others have recommended a quinin derivative, viz. ethylhydrocuprein, which has proved to be very valuable in pneumococcic infections. The injured eye is immediately inundated every hour with a 1 per cent. solution of ethylhydrocuprein hydrochlorid, to protect it against keratitis from pneumococci, which is so extremely dangerous to the eye.

[*Journal of the American Medical Association*, Chicago, August 8, 1914.]

LIGHTING AND EYE-STRAIN. EDITORIAL.

In commenting upon a paper on "The Problem of Lighting and Its Relation to the Efficiency of the Eye," by C. E. Ferree, published in *Science*, July 17, 1914, the *Journal* emphasizes editorially a few facts regarding lighting and eye-strain which should prove of vital interest to every practitioner of dentistry, which in all its branches imposes such severe strain upon eye-sight.

There is no organ of the body, outside of that limited group which is absolutely indispensable for the maintenance of life, which contributes more to human efficiency and personal comfort than does the eye. When we stop to consider the prolonged demands made on the organs of vision in these days of printing, and the shameful indifference with which their conservation is regarded, it is surprising that they do not fail in their task more frequently than is actually the case. The muscular and nervous systems give a warning when they are called on in undue measure. Premonitory symptoms of fatigue or pain serve to prevent harmful over-exertion. But our eyes receive rarely any studied consideration except at long intervals, and then usually under the pressure of impending damage to sight, nor are we concerned as a rule with any adjustment of the needs of the visual apparatus so as to relieve it of any unnecessary burdens or make its task easier of accomplishment.

It is interesting to know that the industries concerned with the manufacture of lighting devices are recognizing the need of physiologists as a part of their scientific equipment. The four types of lighting in common use today are daylight, direct lighting systems, indirect systems, and semidirect systems. The evenness of illumination and the proper diffuseness of the light with exclusion of all extremes of surface brightness are ideal conditions, best realized at present in the proper illumination of a room by daylight. The best distribution effects given by artificial lighting are obtained with the indirect systems in which the source is concealed from the eye, and the light is thrown against the ceiling or some other diffusely reflecting surface. In the direct systems the tendency is to concentrate the light on the object viewed, and too often the eye is not properly shielded from the source of light. The semidirect systems represent a compromise in which a part of the light is transmitted directly to the eye through a translucent reflector and a part reflected to the ceiling. Like most other compromises, this one is not ideal. Ferree asserts that among the lighting factors which influence the welfare of the eye, those grouped under the heading "distribution" are apparently fundamental. The newest tests seem to indicate that where the light is well distributed in the fields of vision, and there are no extremes of surface brightness, intensities bright enough to give a maximum discrimination of detail may be employed without causing appreciable damage or discomfort to the eye. We are further told that for the kind of distribution effects given by the majority of lighting systems now in use, too much light for the welfare and comfort of the eye is being employed. Under many of the systems of direct lighting the eye loses greatly in efficiency as the result of three or four hours of work. In this time it loses practically nothing under daylight, and little more under good systems

of indirect lighting. According to Ferree, our problem in lighting at present is not so much how to see better as it is to see with more comfort and with less damage to the general health on account of eye-strain.

[*La Revue de Stomatologie*, Paris, July 1914.]

MENTAL DISORDERS DUE TO COCAIN INTOXICATION. By Ch. Vallon.

Vallon reported before the Académie de Médecine the effects of the abuse of cocain, which rapidly produces mental disorders which may assume the nature of true psychoses. Such psychoses usually occur in two forms, one of gradual development, the other of acute or subacute nature. In the gradual form, two successive periods are distinguished, the first consisting in disorders of the sensorium, illusions and hallucinations, the second in delirious attacks. In cases of the first group, all the senses may be affected in the following order of frequency: General sensibility, sight, hearing, rarely taste and smell. The most remarkable disorder of sensibility is the sensation of small animals or worms under the skin, which by some writers is considered to be pathognomonic; in reality this symptom is observed only in cases of severe intoxication. and not even in all these. The hallucinations of sight are polymorphous and mobile, often zoöpsic. The delirium is essentially hallucinatory, the derangement of ideas never being primitive, but attacking the sensorium. The patient retains a certain lucidity which permits him to comprehend words addressed to him and to respond thereto. The delirious ideas most frequently observed are those of persecution, and especially of jealousy; the patient imagines himself to be spied upon, followed, the victim of plots to deprive him of the drug or to do away with him, and to be deceived by his associates. These ideas quickly lead to acts of violence. If the patient is subject to hypochondriasis, he imagines himself to be constipated, deprived of one or several organs, to have his skin full of insects, inducing him to scratch or slash himself. Deprivation of cocain causes the hallucinations to disappear, but the patient sometimes retains delirious ideas or at least a firm belief in the reality of his previous delirium.

The acute form occurs in chronic "fiends," producing attacks of hallucinatory mental confusion. In the early stage, the intoxication produces a more or less marked change in general health, bad humor, lack of will power, insomnia, and nightmare; under the influences of physical fatigue, sexual emotions, over-indulgence in alcohol, or an overdose of the drug, the patient is suddenly seized with violent excitement. In his mental derangement and unconsciousness he resembles a subacute alcoholic, from whom he differs by an incessant desire to talk. These attacks last generally from three to ten days; sometimes the course of the attack is more rapid, resembling the panophobic fits in alcoholics. The acute and subacute attacks are more frequent than the psychoses in systematic cocainism.

The cocain habit is much more quickly established than the morphin habit; cocain fiends soon suffer delirium and violent reactions. Cocain, therefore, is even more dangerous than morphin.

The above statement of the dire results of the cocain habit is of sufficient importance to dentists to be reviewed here, for a great many victims to the cocain habit have been started in their fatal practice by the careless application of the drug by thoughtless practitioners.

[*Zahnaerztliche Rundschau*, Berlin, June 14. 1914.]

ION THERAPY IN DENTISTRY. By Dr. Edgar Neumann, Vienna.

Since Leduc's valuable investigations, the conviction has been gaining ground that ion therapy merits closer attention. At present this form of therapy is still in its infancy; in fact, the ions of a great many substances are not yet known. Ion therapy is of easy execution, requiring only a good transportable battery of from 12 to 24 elements and a potential of from 18 to 36 volts, a well-functionating rheostat, cable, electrodes, and a milliampèremeter. It must be kept in mind that the ions of metals and alkaloids are introduced into the body from the positive electrode, while the ions of non-metallic substances move in an opposite direction. Sturridge was the first to use ion therapy in pyorrhea alveolaris. (See "Cataphoresis in the Treatment of Pyorrhea Alveolaris." Dental Cosmos, December 1897, p. 1060.) In the treatment of this disease, the intensity

of the current is gradually raised from 4/20 to 1 milliampère, 6/20 milliampère sufficing as a rule. The sponge of the positive electrode saturated with a 5 : 100 zinc chlorid solution is moved along the gingival margin to the distal end of the arch and back to the starting-point. Access of saliva must be prevented as much as possible, and the zinc chlorid solution repeatedly applied to the positive electrode. The negative electrode is connected with a metallic vessel filled with warm salt solution, the circuit being closed by the patient dipping one or several fingers into this vessel. The electrodes should be made of platinum, as this metal is not attacked either by the liquid or the current.

The writer reports a case of pyorrhea alveolaris successfully treated by this method, also one of refractory trigeminal neuralgia in which, following McKenna's suggestion, the ions of a 2 per cent. sodium salicylate were introduced, under 5 milliampère for twenty minutes, the anode being applied to the painful region, the cathode to the neck.

PERISCOPE.

Hutchinson's Teeth as an Indication of Insufficiency of the Thyroid.—Arnold Josefson reports a case in which the development of well-marked Hutchinson's teeth could not be ascribed to hereditary syphilis, but seemed to be wholly due to impaired function of the thyroid.—*Dermatologische Wochenschrift*, per *N. Y. Med. Journal.*

Matching Teeth in the Mouth.—When matching the shade of a natural tooth, as a guide to the selection of teeth for a denture, a large mouth-mirror should be placed behind the specimen artificial tooth when in position beside the natural one. This will show up the two teeth and allow of a very much better comparison.—*Edwards' Dental Quarterly.*

Protecting the Pulp Under Silicate Cement Fillings.—A simple means for protecting the pulp under a silicate cement filling consists of a pellet of white gutta-percha of suitable size. White gutta-percha is preferable to pink, as silicates are inserted chiefly in anterior teeth, and the pink gutta-percha might shine through the filling.—*Zahnaerztliche Rundschau.*

"Necrosis" and "Gangrene"—Terminology.—Necrosis and gangrene are two distinct types of tissue death *in situ.* The former may result from any cause, while the *sine qua non* of gangrene is necrosis *plus* saprophytic infection. Unfortunately, in surgical pathology both terms are frequently badly jumbled, as for instance, in the erroneous expression, "carbolic acid gangrene."—H. PRINZ, *Dental Summary.*

To Patch a Leak in Bellows Disk.—Often a bellows disk will break during an important soldering operation. To make a quick repair—providing the break is not too large—a piece of red vulcanite of about twice the size of the break is cut, moistened with a little gasoline, and pressed firmly to place. The linen cover should not be removed from the rubber, for it makes a stronger patch.—R. L. HESSER, *Dental Summary.*

Relieving Undue Pressure of a Denture.—Now and again it is difficult to locate the exact spot on a denture that is causing an abrasion of the mucous membrane. In these cases, a piece of gummed paper, the gum side up, is placed carefully over the abraded surface. The denture is moistened and carefully placed in position with slight pressure. On carefully removing it, the paper will be found adherent at the point causing the trouble.—*Dental Brief.*

Emergency Repair of a Broken Vulcanite Denture.—A temporary emergency repair of a broken vulcanite denture, to tide the patient over it until it is convenient to repair it properly, may be effected in the following manner: With a small rose-head bur in the engine a row of holes is drilled on each side of the break one-eighth of an inch apart and one-eighth of an inch from the edge of the fracture. The two pieces are then laced together with waxed floss silk or any strong thread, affording a surprisingly strong joint.—H. S. TAYLOR, *Australian Journal of Dentistry.*

Holding Cotton on a Smooth Broach.—Cotton can be easily attached to a smooth broach by drawing the broach across a piece of sterile beeswax before twisting the fiber of cotton upon the broach. Any amount of cotton may be firmly attached to the broach in this manner, and it will not become loosened in pumping a drug into a root-canal. This method is also very valuable in drying root-canals.—C. D. Lucas, *Oral Health.*

Asepsis of the Engine Handpiece.—When all precautions are taken to sterilize the instruments needed for a dental operation and everything connected therewith, it is only logical to sterilize the handpiece also. In order to facilitate this, a metal sleeve is slipped over the Doriot handpiece and held tight by a set-screw to prevent its slipping off. Several sleeves are kept so as to permit the use of an aseptic one for each patient.—H. L. Weber, *L'Odontologie.*

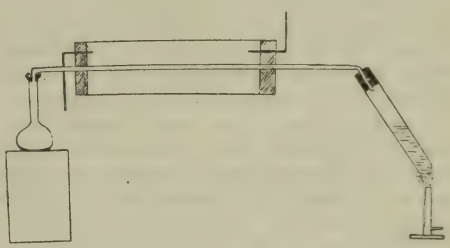
Identification by the Teeth.—An interesting case of identification by the teeth has been reported in the daily press. The body of Mrs. John Hemmen of Waukegan, Ill., who had been missing since March 17th, which was found in Lake Michigan on April 27th in such an advanced stage of decomposition as to render recognition impossible, was identified beyond doubt by the deceased's dentist, who was called upon to give testimony at the coroner's inquest.

The Ideal Tooth-brush for Once Using.—Users of natural fibrous tooth-brushes or tooth-sticks are not confined to savage or semicivilized communities. Twigs of the black gum and strips of thick hickory bark are used by many in the rural districts of the southern states of America. Tests recently made by several investigators conclusively prove that the tooth-brush in ordinary use remains in a more or less constantly septic condition. Publicity has been given to these investigations in the lay press, but such warnings and advice will probably have but little effect in arousing the average individual to habitual or even casual attempts to sterilize his tooth-brush. A recently invented flexible tooth-brush attached to a finger stall offers undoubted facilities in manipulation and the getting at remote crevices, but the difficulty of sterilizing appears to remain, or is increased.

Meanwhile we must be content to await the time when an efficient tooth-brush or tooth-stick that can be used but once and then thrown away becomes an economic possibility.—*Dental Record.*

Case of Nail-biting (Onychophagy) Treated by Dental Prosthesis.—Guibaud reports a case of inveterate onychophagy in a male, forty-one years of age. Owing to the patient's extremely nervous condition and the embarrassment coincident to this habit, treatment by prosthetic means was undertaken, and gold caps were cemented to the first and second upper molars on both sides, in order to raise the bite. It was subsequently necessary to accentuate the cusps on these caps, as the patient used the bicuspids to bite off his nails. After two months the habit was broken and the appliance removed. It is possible that the fact of limiting the movements of the temporo-mandibular articulation by raising the bite may produce considerable inconvenience, perhaps to the extent of giving rise to deformities difficult to correct, especially in patients of a certain age whose joints are not elastic like those of children, for whom one uses orthodontic appliances. It seems that sufficient thought has not been given to this possibility in orthodontic treatment. [Reviews of cases of nail-biting and their treatment may be found in Cosmos, July 1908, p. 752, and May 1911, p. 608.]—*Sud-Est Dentaire*, per *Dental Record.*

Home-made Apparatus for Distilling Water.—A satisfactory apparatus for distilling small quantities of water as so often required for making solutions, especially for



purposes of local anesthesia, can be made in the following manner: A cooler is made of a cylinder of sheet metal, closed at both ends with corks, which might be secured by sticky-wax. These corks are perforated in the middle, and long thin glass tubing is passed through these holes and bent at each end to suit conditions, over a Bunsen burner. (See figure.) In order to obtain small quantities of aqua destillata quickly, a large test tube is employed. It is possible by this simple contrivance to obtain 20 cc. of aqua destillata in about ten minutes.—W. Merres, *Deutsche Zahnaerztliche Wochenschrift.*

Safe and Easy Method of Applying Silver Nitrate to Teeth.—In applying silver nitrate to teeth there is danger of particles coming in contact with the soft tissues, or of being swallowed, both of which accidents may be of serious consequence. A suitable wire point of Victoria metal is heated over a flame, and dipped into a bottle in which the silver nitrate crystals are being kept. The crystals will adhere to the hot wire, and can be melted to form a point or bead, which is applied to the desired portion of the tooth. If the silver is to be applied in the interdental space, the drug is melted in a similar manner to a thin bronze wire as employed in orthodontia. After use the wire point is again held in a flame and the silver nitrate is burned off, leaving a coating of pure silver. In this way accidental contact with the operators' fingers, linen, etc., is avoided.—F. ZADER, *Deutsche Zahnaerztliche Wochenschrift.*

Obtaining Sharp Impressions with Modeling Compound.—Immediately before inserting the mass of plastic modeling compound in position it is slightly coated with vaselin, and as soon as it is in position, quickly chilled with ethyl chlorid spray. The harder varieties of the compound, which require a high heat to soften and set quickly, are not sufficiently plastic to take the sharp lines. The more plastic varieties are somewhat "tacky," and have a tendency to cling rather than to glide over the surfaces against which they are pressed; this is overcome by the vaselin. They also set slowly, and during the setting process have a tendency to "creep," or leave the surface against which the compound is molded. The ethyl chlorid spray can be quickly directed against the entire surface of the impression tray and promptly checks its creeping; its continued application for a few seconds thoroughly chills the impression and so hardens it that it can be removed without distortion. Impressions taken in this manner are as sharp as plaster impressions.—G. F. LOGAN, *Dental Brief.*

Attaching Vulcanite to a Metal Plate.—A simple and very effective method of insuring the attachment of vulcanite to a struck-up plate of any metal is the following: Before casting the zinc die, a narrow ridge of wax is built up, about ⅛ inch high, all around the alveolar ridge, just behind where the teeth will be mounted. When the die and counterdie are poured, this ridge will be reproduced on the one and a corresponding groove on the other. When the plate is struck up it will present a hollow bar, out of which we proceed to cut sections by means of a square-end carborundum wheel, fret-saw, or file, so that instead of the continuous ridge there is a series of upstanding loops. The teeth should be mounted, and the case finished on the plaster model with the wax bar still in place, and then flasked in the regular manner. When the wax is washed out, all trace of the bar will, of course, disappear, and the groove in the plate is carefully packed with rubber. When vulcanized the rubber will be so intimately connected with the metal that separation is impossible. The extra time occupied in forming the wax ridge in the first place, and cutting the openings, is considerably less than that required to solder on loops, or to roughen the plate with the stippler, while the attachment is far stronger.—*Edwards' Dental Quarterly.*

Rebreathing in Nitrous Oxid and Oxygen Anesthesia and Analgesia.—Rebreathing is being practiced almost universally in nitrous oxid and oxygen anesthesia and analgesia. My reasons for using this method are fourfold:

(1) To prevent over-ventilation of the blood by rapid or deep breathing, thus reducing the elimination of CO_2 by the lungs to its normal, and combating shock. (2) To stimulate the shallow breather to take full-size inhalations, thus increasing the gas absorption in the lungs, and securing desired results which might be more or less unsatisfactory without it. (3) To prevent the waste of gas which has not reached the deep portion of the lungs and has not been used, although it has been in the upper air-passages. (4) Incidentally, to reduce the cost of analgesia.

How much should we rebreathe? In rough figures, one-half of each exhalation should be stored up for re-inhalation along with the fresh gases at the next breath. The first portion of each exhalation should be the part selected for rebreathing, because it contains 140 cc. of gases that did not reach below the bronchi, and therefore took no part in gaseous interchange, and is as good as it was when it came from the tanks. The latter portion of exhalation is rich in CO_2 since it came from the deep or alveolar portion of the lungs, and most of this portion should be eliminated at each exhalation, and not rebreathed. This selection is made automatically after adjusting the rebreathing bag to the desired capacity.—E. I. MCKESSON, *Ash's Monthly.*

Hints, Queries, and Comments.

NITRIC ACID FOR REMOVING VULCANIZED RUBBER FROM TEETH.

To the Editor of the Dental Cosmos:

Sir,—In glancing through the "Periscope" in the September Cosmos I find a method for removing vulcanized rubber from teeth by the process of heating in an alcohol flame. If you can find space in your next issue, will you kindly advise your readers that the same object is better accomplished by inserting the teeth in a test-tube containing nitric acid, which acts as a physical solvent for the vulcanite?

If necessary, to hasten the removal of the rubber, a little heat from the Bunsen burner applied to the tube will leave the porcelain teeth and pins free from rubber and any other substance, and they will emerge from the fuming bath in a very clean and gratifying condition. By this process any and all danger of fracture or checking of porcelain is absolutely eliminated.

Respectfully,

John L. Kaufman, D.D.S.

New York City.

RETENTION OF UPPER DENTURES.

In the discussion of the subject of the retention of upper dentures, perhaps the experience of seventy years, devoted exclusively to plate work, might throw some light on the subject, at least to the young men coming into practice in great numbers every year.

For thirteen years previous to the introduction of vulcanite, metal work prevailed exclusively.

My preceptor, Dr. M. P. Hanson, practicing in Salem, Mass., and later in Boston, was one of the first—in fact, I think, was the first—about 1843, to use plaster for impressions and to make a suction plate, and I will relate the occasion.

Using the common plaster in vogue for models, he secured a satisfactory impression. For the die he used tin. As lead cannot be poured upon tin, it was necessary to cast the counterdie first. This was done by drying the model and holding it in the lead until it was hard; then, knocking out the plaster, a rim of several thicknesses of paper was placed over the counterdie, and the tin was poured. The gold plate was then swaged. Upon trying it in the mouth the adhesion was so strong that he wished to test it, which he did by soldering to the center of the plate a loop to which was attached a long wire holding suspended a common water-pail filled with water; this the patient lifted from the floor before the plate became detached. Previous to that time dentures had been narrow plates held in place by spiral springs carried inside the cheek; from that time, however, my preceptor had no further use for springs. The plate came into close contact with the membrane all over the surface, and the result was adhesion. Later on, Levi Gilbert, a dentist of New Haven, introduced the air-chamber, which soon came into general use. I used it for many years, but of late years have seldom found occasion for its employment.

The theory of the retention of upper dentures is simple. Every dentist knows that the center of the palate is hard, but does not seem to consider that it is the only portion of the jaw that does not change, whereas the alveolar border does change—under vulcanite, on account of its non-conductivity, changing excessively in seventy-five per cent. of cases; under the metal plate also changing to some extent. Unless provision be made for such change it is only a question of time when the plate, instead of resting on the ridge, will be resting hard on the palate and rocking.

To overcome this difficulty, in making a metal plate I place on the model a "relief," employing the usual base-plate wax, extending from near the top of the ridge and covering the entire hard surface, averaging in

width half an inch, somewhat narrower at the anterior, and thinning at the margin so as to leave no distinct impression. The plate must of course extend at least an eighth of an inch beyond the relief. In a vast majority of cases plates can be worn farther back than as usually made.

A test of this principle is found in the heavy continuous-gum denture in flat jaws. In these instances I never use an air-chamber. And if it is not needed in these cases, where is it needed? And if weight does not count here, where does it count?

There is a small percentage of cases (about 3 per cent.) in which the palate is soft, and usually in these instances a crevice is observed. In such cases I employ neither relief nor air-chamber, but simply fit the plate close to the membrane. In vulcanite dentures, scrape the impression or the plate when it is being finished.

There are more failures from faulty occlusion than from any other cause. The anterior teeth must never come in contact, the pressure coming on the bicuspids and first molars.

Loomis P. Haskell.

Chicago, Ill.

MAKING NEAT PLASTER MODELS WITH LITTLE LABOR.

A strip of cardboard is bent around the impression tray, and the two overlapping ends are pinned together. This strip can be cut to any desired width according to the thickness of the model wanted. After pouring the plaster, the top is leveled off with a spatula to the margin of the cardboard strip. As soon as the plaster begins to set, the cardboard is removed. The resulting model will be found to be neat, and the time and labor required for carving models is largely saved.

Wright B. Lee, D.D.S.

Junction City, Oregon.

Obituary.

DR. LESLIE E. PALMER.

Died, August 13, 1914, in New York City, of appendicitis and adhesions of the intestines, Leslie Edwin Palmer, D.M.D., in his thirty-fourth year.

Dr. Palmer was born in Palmer, Mass., November 23, 1880, as the son of J. E. Palmer and Clara I. (Allen) Palmer. His early education was received in the schools of Massachusetts, and he was graduated in 1907 from Tufts Dental College.

Immediately upon graduation he associated himself with E. Wünsche of Berlin. He remained there two and one-half years, and returned to New York to become the associate of Dr. Henry W. Gillett. In that association he had rapidly built up a remunerative practice, and had developed marked ability in practical roentgenology.

The deceased is survived by his wife, *née* Jeannette E. Rommel of Kingston, N. Y.

H. W. G.

"IN MEMORIAM" RESOLUTION.

Dr. Geo. Edwin Hunt.

At a meeting of the Wisconsin State Dental Society, held at Fond du Lac, July 16, 1914, the following resolution was adopted:

Whereas, Almighty God in His infinite wisdom has seen fit to remove from the scene of his earthly labors Dr. Geo. Edwin Hunt, M.D., D.D.S., and whereas the Wisconsin State Dental Society desires to record its appreciation of him as a man and its sense of sorrow at his death; therefore be it

Resolved, That the Wisconsin State Dental Society extends to the family of the deceased their sincere sympathy in their bereavement, and that this resolution be spread upon its minutes and a copy sent to the family and to professional journals for publication.

W. F. Faust,
Chas. L. Babcock,
E. A. Geilfuss,
Committee.

Brief Necrology.

Dr. CHARLES BULLOCK of Cambridge, Mass., on March 16, 1914.

Dr. J. M. FISHER of Waukegan, Ill., on July 19, 1914, from accidental drowning.

Dr. AMOS SANDERSON of Orrville, Ohio, on July 3, 1914, in an automobile accident, in his fifty-third year.

Dr. PHILIP W. W. SAUCIER of Scranton, Miss., on June 29, 1914, from pneumonia, in his forty-eighth year.

Dr. HIRAM C. HOWER of Bloomsburg, Pa., on August 22, 1914, of a complication of diseases, in his ninety-second year.

Dr. OLAF LANGE of Chicago, Ill., on August 7, 1914. Deceased was a graduate of the Northwestern University Dental School.

Dr. MYRON D. JEWELL of Richfield Springs, N. Y., on August 13, 1914. Deceased was a graduate of the Philadelphia Dental College.

Dr. ROSS A. PRITCHETT of Whitehall, Ill., on July 8, 1914, in his thirty-ninth year. Deceased was a graduate of the Northwestern University Dental School.

Dr. FREDERICK H. MARTIN of Brooklyn, N. Y., on July 18, 1914, from hemorrhage of the brain. Deceased was a graduate of the New York College of Dentistry.

Dr. WILLIAM J. LAWSON of Sedalia, Miss., on August 8, 1914, from appendicitis, in his thirty-eighth year. Deceased was a graduate of the Cincinnati College of Dental Surgery.

Dr. JAMES ALBERT LINDSAY of Sacramento, Cal., on July 12, 1914, of typhoid fever, in his thirty-fifth year. Deceased was a graduate of the College of Dentistry, University of California.

Dr. JOHN AKIN MILLARD of Dinard, France, on July 29, 1914, in his seventy-second year. Deceased was a graduate of the Baltimore College of Dental Surgery and the Maryland Dental College, and retired captain of artillery, in which capacity he participated in the civil war.

SOCIETY NOTES AND ANNOUNCEMENTS.

ASSOCIATION OF MILITARY DENTAL SURGEONS.

AT the annual meeting of the association at Rochester, July 7th, the following officers were elected to serve the coming year:

Dr. Wm. C. Fisher, president, New York City; Dr. John D. Milliken, first vice-president, San Francisco; Dr. Wm. H. Ware, second vice-president, San Francisco; Dr. Chas. J. Long, secretary, Rock Island, Ill.; Dr. R. W. Waddell, treasurer, New York City.

WM. C. FISHER, *Pres.*

WISCONSIN STATE DENTAL SOCIETY.

AT a meeting of the Wisconsin State Dental Society the following officers were elected: Wm. Hopkinson, Milwaukee, president; A. Gropper, Milwaukee, treasurer; O. G. Krause, Milwaukee, secretary.

O. G. KRAUSE, *Sec'y*,
1209 Wells Bldg., Milwaukee, Wis.

CHICAGO DENTAL SOCIETY.

THE annual clinic of the Chicago Dental Society will be held in the Hotel La Salle, January 29 and 30, 1915.

The officers and committees are planning a program for this meeting, which they feel sure will be of interest to every dental practitioner who can arrange to be in Chicago at this time.

T. L. GRISAMORE, *President*,
P. B. D. IDLER, *Sec'y*.

FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT (N. Y.) DENTAL SOCIETIES.

THERE will be a union meeting of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at the Hotel Iroquois, Buffalo, N. Y., November 19, 20, and 21, 1914.

J. PORTER MALLORY, *Ch'man*,
Local Committee.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties will hold its meeting on January 26 and 27, 1915, at Ann Arbor, Mich. Headquarters, the Allen Hotel.

This meeting will precede the Teachers' Association meeting, which will be held January 28th to 30th. Besides the regular business there will be several papers of interest to educators read before the association.

The Executive Committee meets at nine o'clock, on Tuesday, January 26th. Regular session will open at ten.

B. Holly Smith,
Ch'mn Executive Committee,
Chas. C. Allen, *Sec'y.*

THE FORSYTH DENTAL INFIRMARY FOR CHILDREN.

Invitation to Dedication Ceremonies.

The ceremonies incident to the formal dedication of the Forsyth Dental Infirmary for Children will take place on November 24, 1914, at the Infirmary, 140 Fenway, Boston, Mass.

Many new and interesting features relative to dental equipment will be on view, and visitors will be afforded opportunity to study the magnitude of the undertaking as well as the inner working of the institution.

A cordial invitation is extended to all members of the dental profession to be present.

Harold DeWitt Cross, D.M.D., *Director.*

IOWA STATE DENTAL SOCIETY.

Northwestern District.

The Northwestern District of the Iowa State Dental Society will hold a clinic and manufacturers' exhibit at the Martin Hotel, Sioux City, Iowa, November 30 and December 1, 1914.

Nearly all of the leading manufacturers have signified their intention of having a representative present with a full line of exhibits.

The following men will appear on the program: Dr. T. B. Hartzell, Minneapolis, pyorrhea clinic and paper on "Secondary Infection." Dr. W. H. MacNeil, Minneapolis, paper and clinic on "Conductive Anesthesia." Dr. T. J. Kirby, Holton, Kans., paper on "Dental Ecomonics."

A banquet and special entertainment will be a special feature.

C. E. Westwood, *Sec'y.*

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

Special Anniversary Meeting.

A special anniversary meeting of the Academy of Stomatology will be held at 8 p.m., on Tuesday, November 24, 1914, at the College of Physicians.

Dr. Thomas B. Hartzell will present a paper entitled "Experimental Lesions Produced in Healthy Animals by Means of Streptococci obtained Deep in the Tissues Contiguous to the Teeth."

This meeting will commemorate the twentieth anniversary of the founding of the Academy of Stomatology and will be preceded by a dinner.

Dudley Guilford, *Sec'y.*

OHIO STATE DENTAL SOCIETY.

The forty-ninth annual meeting will be held in Memorial Hall, Columbus, December 1, 2, and 3, 1914. The entire state is now organized into components, and a very large attendance is anticipated.

Papers will be read by—

Dr. Wm. A. Giffen of Detroit, Mich., on "Technic for Taking Impressions and Making Models for Constructing Artificial Dentures," giving demonstrations with moving pictures.

Dr. H. W. McMillan of Cincinnati, on "Diagnosis and Treatment of Trifacial Neuralgia."

Dr. W. W. Curtiss of Greenfield, O., on "Conservation *vs.* Radicalism."

Dr. J. R. Callahan of Cincinnati, "A Lantern Lecture on the Use of Rosin in Operative Dentistry."

A selected list of progressive clinics will be given on Wednesday forenoon, and general clinics on Thursday forenoon.

One evening will be given to a Health Conservation Conference, to be participated in by all professions and interests devoted to the furtherance of human health and welfare.

A cordial invitation is extended to all society members from other states.

F. R. Chapman, *Sec'y.*

SERVICE IN MEMORY OF DR. GEORGE EDWIN HUNT.

Memorial Meeting at Indianapolis.

The dental profession of Indiana will have a memorial service in honor of the memory of Dr. Geo. E. Hunt, to be held in the auditorium of the Masonic Temple, North and Illinois sts., Indianapolis, Ind., on the evening of November 21, 1914, at eight o'clock. The principal address will be by Dr. John N. Hurty.

The friends of Dr. Hunt are cordially invited to attend this service.

Carl D. Lucas, *Ch'man of Committee.*

IOWA BOARD OF EXAMINERS.

The next meeting of the Iowa State Board of Dental Examiners for the examination of candidates will be held at Iowa City, Iowa, commencing Monday, November 30th. For application blanks and particulars write to

J. A. West, *Sec'y,*
417 Utica Bldg., Des Moines, Iowa.

ILLINOIS BOARD OF EXAMINERS.

The next meeting of the Illinois State Board of Dental Examiners, for examination of applicants for license to practice dentistry in the state of Illinois, will be held at the Chicago College of Dental Surgery, Chicago, Ill., commencing at 9 A. M., November 9, 1914.

Application, together with fee, $26, should be filed with secretary at least five days prior to date of examination.

O. H. Seifert, *Sec'y,*
Springfield, Ill.

CONNECTICUT DENTAL COMMISSION.

The Connecticut State Dental Commission hereby gives notice that it will meet at Hartford, November 19, 20, and 21, 1914, to examine applicants for license to practice dentistry in the state, and to transact any other business proper to come before it.

Application blanks, copies of the revised requirements, rules, etc., will be mailed by the Recorder upon request.

Edward Eberle, *Recorder,*
902 Main st., Hartford, Conn.

MARYLAND BOARD OF EXAMINERS.

The Maryland Board of Dental Examiners will meet for examination of candidates for certificates on November 5 and 6, 1914, at the Baltimore College of Dental Surgery, Baltimore, at 9 A. M.

For application blanks and further information apply to

F. F. Drew, *Sec'y,*
701 N. Howard st., Baltimore, Md.

MICHIGAN BOARD OF EXAMINERS.

The semi-annual meeting of the Michigan State Board of Dental Examiners will be held in the Dental College at Ann Arbor, commencing Monday, November 9th, and continuing through the 14th. For full particulars and application blanks address the secretary.

Michigan Licentiates Please Note.

The licenses of all Michigan licentiates, whether practicing in the state or not, who have not paid their annual registration fee, will be revoked at the next regular meeting of the board, which will be held in Ann Arbor, November 9th to 14th.

F. E. Sharp, *Sec'y,*
Port Huron, Mich.

INDIANA BOARD OF EXAMINERS.

The next meeting of the Indiana State Board of Dental Examiners will be held at the State-house, Indianapolis, commencing Monday, November 16, 1914, and continuing five days. For application blank and full particulars address the secretary.

Annual Registration of Dentists.

Those wishing to register in Indiana, please notice!—In compliance with Section 9 of an Act to Regulate the Practice of Dentistry in the State of Indiana, approved March 8, 1913: "On or before the 31st day of December of each year each dentist now licensed or subsequently licensed to practice dentistry in this state shall transmit to the secretary of the State Board of Dental Examiners his

signature and address, together with the fee of one dollar and the number of his or her registration certificate, and receive therefor a renewal license certificate. Said renewal license certificate shall be at all times properly displayed in the office of the one who is named in the license, and no person shall be deemed in legal practice who does not possess such renewal certificate. Any license granted by said board shall be canceled and annulled if the holder thereof fails to secure the renewal certificate herein provided for within a period of three months after December 31st of each year; provided that any license thus canceled may be restored by the board upon the payment of a fee of five dollars, if paid within one year after such cancellation."

Notices will be mailed to all dentists registered in Indiana to their last known address, on or before December 31, 1914. Failure to receive such notice will not be an exemption or an excuse for non-payment. In such cases all persons should notify the secretary, giving their correct address. This also applies to all those living outside the state.

Dr. Fred J. Prow, *Sec'y*,
Bloomington, Ind.

OKLAHOMA BOARD OF EXAMINERS.

The Oklahoma State Board of Dental Examiners will hold its regular meeting at Muskogee, Okla., commencing December 7, 1914, at 9 A. M., for the purpose of examining applicants for license to practice dentistry in Oklahoma.

All applicants must present his or her diploma from a reputable dental college of good standing, of which the board shall be the judge.

The written examination will be upon subjects taught in our reputable dental colleges. Operative and mechanical dentistry will also be required, and applicants should come prepared with engines, instruments, and material for doing such work. Our law makes no provision for temporary licenses.

Applications should be filed at least ten days prior to date set for examination. Address

E. E. Heflin, *Sec'y*,
200½ W. Main st., Oklahoma City, Okla.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners will be held in Cathedral Hall, Galveston, Texas, beginning Monday morning, December 14, 1914, at 9 o'clock. No interchange of licenses with other states.

Applications, accompanied by the fee of $25, should be in the hands of the secretary not later than December 10th. For official application blank, or for further particulars, address

C. M. McCauley, *Sec'y*,
434 Wilson Bldg., Dallas, Texas.

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in the city of San Francisco, beginning on December 7, 1914, at 10 A.M.

Applicants for examination will file their applications with the board on the morning of December 7th. Each application must be accompanied by the fee of twenty-five dollars and the necessary credentials—diploma or license from other states—together with a recent unmounted photograph of the applicant.

For further particulars address

C. A. Herrick, *Sec'y*,
133 Geary st., San Francisco.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular semi-annual business meeting and examination in the assembly chamber of the State-house, Trenton, N. J., on December 7, 8, and 9, 1914.

License fee $25. No interchange of license. Practical tests required. Gold filling in an approximal surface of a tooth, also a bridge consisting of three or more teeth, exclusive of abutments and one Richmond crown—gold metal—mounted and articulated. Applications must be filed *complete* with the secretary ten days before the date of the examination.

Attention is directed to the following requirement: "All applicants for a license to

practice dentistry in New Jersey shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college he or she had obtained an academic education, consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof."

In accordance with the above ordinance, the secretary will issue application blanks to applicants only upon presentation of the required certificate from the superintendent of public instruction, Trenton, N. J.

For further particulars apply to

ALPHONSO IRWIN, *Sec'y*,
425 Cooper st., Camden, N. J.

WISCONSIN BOARD OF EXAMINERS.

THE Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on December 14, 1914, at 10 A. M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee to be filed with the secretary ten days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations. Special application blanks for this examination and $10 fee, together with high-school credits, to be filed ten days in advance.

S. H. CHASE, *President*,
W. T. HARDY, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board will hold a session for the examination of candidates on the second Monday in January 1915.

G. A. CHEVIGNY, *Sec'y*,
Butte, Mont.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS.

THE next examination of applicants for license to practice dentistry in the District of Columbia will be held at the George Washington University, January 4, 5, 6, and 7, 1915. Applications should be in the hands of the secretary two weeks before the date of examination. Fee $10.

STARR PARSONS, *Sec'y*,
1309 L st., N. W., Washington, D. C.

NEW SOUTH WALES.

AMENDING THE DENTISTS' ACT OF 1912.

A BILL has been introduced in the Legislative Council of New South Wales to further regulate practice in dentistry, and to amend the Dentists' Act of 1912. The bill provides that—

Any registered dentist who makes use of any title or description which has not been conferred upon him by some duly qualified body shall be deemed guilty of infamous conduct in a professional respect.

Any person who for five years immediately preceding the act going into force has solely and continuously practiced dentistry in New South Wales, on his own account, may, for three years after such commencement of the act, continue so to practice; and if before the expiration of such three years he passes before the board an examination in surgical and mechanical dentistry, and materia medica (dental), he shall be entitled to registration under the act.

Operative assistants for five years, who also pass the examinations, shall be entitled to registration. Two years' practice preceding the act shall entitle a person to serve as an assistant to a registered dentist for a term which, with the period of his practice, would amount to five years.

Persons must within three months register their names with the board, and satisfy the board as to their practice and employment and good character. Persons wrongfully taking the name of dentist will be liable to a penalty not exceeding £20. The same maximum penalty has been fixed for persons other than legally qualified medical practitioners, or registered dentists, or practitioners under the authority of the act, who practice dentistry.

ARMY DENTAL SURGEONS.

MEMORANDA OF CHANGES.

For the week ending August 22d:

First Lieut. George E. Stallman is relieved from duty at Fort Sam Houston, Texas, and will proceed at the proper time to take the transport to sail from San Francisco, Cal., on or about November 5th, for Honolulu, H. T.

For the week ending August 29th—(No changes).

For the week ending September 5th—(No changes).

For the week ending September 12th:

First Lieut. F. L. K. LaFlamme reports return to his station from one month's leave of absence; station Fort Hamilton, N. Y.

First Lieut. Samuel H. Leslie reports on twenty days' leave of absence; his address while on leave will be Monticello, Ark.

For the week ending September 19th—(No changes).

For the week ending September 26th—(No changes).

For the week ending October 3d—(No changes).

For the week ending October 10th—(No changes).

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER 1914.

September 1.

No. 1,109,080, to MELVIN E. MERKER. Artificial tooth.

No. 1,109,096, to JOHN A. WEST. Dental crown remover.

No. 1,109,318, to ARTHUR W. BROWNE and FREDERICK L. WALLACE. Surgical inhaler.

No. 1,109,651, to MELVIN E. MERKER. Artificial tooth.

September 8.

No. 1,109,924, to HARRY M. HOFFMAN and WALTER B. GARRETT. Dental instrument.

September 15.

No. 1,110,379, to THOMAS D. CRAIG. Dental crown remover.

No. 1,110,406, to EDWARD SCHRECK. Tooth-brush.

No. 1,110,680, to FREDERICK O. GAMBLE. Tool for using dental floss.

No. 1,110,791, to JAMES W. IVORY. Anchor for artificial teeth.

No. 1,110,954, to MORTON MAIER. Dental casting machine.

September 22.

No. 1,111,019, to JOHN E. HAMILTON. Tooth-brush.

No. 1,111,110, to JACOB TROST. Dental pliers.

No. 1,111,136, to BENJAMIN F. COPP. Hygienic dish for tooth-powder or paste.

No. 1,111,144, to HARRIS EPSTEIN and WILLIAM CILER. Tooth-brush.

No. 1,111,392, to LOUIS F. KOEHLER. Dental anvil or swage block.

No. 1,111,603, to JOSEPH P. MERTES. Dental forceps.

No. 46,450, to JULES J. SARRAZIN. Design for tooth-brush.

September 29.

No. 1,111,730, to HENRY P. BOOS. Dental bridge.

No. 1,112,180, to CHARLES W. WESTENFELTER. Dentifrice.

No. 1,112,252, to GEORGE L. BIENVENU. Artificial tooth.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

NARCOSIS.

By W. GUY, F.R.C.S., L.R.C.P., L.D.S., Edin., Edinburgh.

(Address delivered before the Sixth International Dental Congress, London, at the Central Hall, Westminster, on August 4, 1914.)

EVERY text-book on anesthesia contains a history of the earliest applications of narcotic vapors for the production of surgical anesthesia. The general impression in the public mind associates the name of Sir James Simpson with the discovery of anesthesia, but that eminent man correctly stated the matter in a letter to Dr. Jacob Bigelow of Boston, written in April 1870. In this letter he states categorically that—(1) Horace Wells, a dentist of Hartford in Connecticut, on December 11, 1844, had an upper molar tooth extracted without pain, after having breathed nitrous oxid gas for the purpose, as suggested nearly half a century before by Sir Humphry Davy; (2) that Horace Wells' former pupil and partner, Dr. Morton of Boston, on September 30, 1846, extracted a tooth without pain while the patient was under the influence of breathing sulfuric ether, this fact and discovery of itself marking a *new era* in anesthetics and in surgery; (3) that within a few weeks the vapor of sulfuric ether was tried in a number of instances of surgical operations in Boston, and ether vapor was established as a successful anesthetic in dentistry and surgery; (4) that in January 1847 Simpson first used sulfuric ether as an anesthetic in obstetric practice; (5) that on November 15, 1847, Simpson discovered the anesthetic properties of chloroform, in Edinburgh, and that it swiftly superseded, in Scotland and elsewhere, the use of sulfuric ether, and extended rapidly and greatly the practice of anesthetics in surgery, midwifery, etc.

To us, as dentists, the reflection that it is to a member of our profession that humanity owes the priceless boon of surgical anesthesia must be ever a source of pride and satisfaction. It is true that in his life Wells received neither honor nor profit from his discovery, and that he died by his own hand, a bitterly disappointed man. His memory will, nevertheless, live for ever. A statue of him stands in Hartford, and a monument to him was unveiled at Paris in

1910, during the session of the F. D. I.;—I am proud to have been present at that function.

The fact that tooth extraction is the operation performed with by far the greatest frequency on the human subject constitutes it also the most frequent occasion for the administration of a narcotic vapor. We find, consequently, that most of our distinguished anesthetists have labored in the field of dental anesthesia, and that much of the experience that has led to the evolution of improved methods and instruments, and to increased safety, has been gained beside the dental chair.

Thanks to the powerful advocacy and predominating influence of Sir James Simpson, chloroform did swiftly supersede the use of ether, and in Scotland it became practically the only anesthetic in common use for surgical and obstetrical work. What its future may be in these departments it is not for me to surmise, but in so far as dental operations are concerned, I have, during my professional life, never ceased to maintain that it is the most unsuitable and dangerous of anesthetics, and that its employment in such cases can be but seldom justified. I am glad to have banished it from the Edinburgh Dental Hospital, and from the dental department of the Edinburgh Royal Infirmary, but I am sorry to know that it is still largely used for the extraction operation, owing to the fact that many medical practitioners have no acquaintance with any other anesthetic.

The late Dr. John Snow, in his book on anesthetics, published in 1858, devotes several pages to chloroform in the extraction of teeth, and it may be interesting to quote this authority of more than sixty years ago. He says:

> I have notes of 867 cases in which I have administered chloroform during the extraction of teeth, chiefly by dentists living in this neighborhood: amongst whom are Mr. Saunders, Mr. Cartwright, Mr. Arnold Rogers, Mr. Thomas A. Rogers, Mr. Tomes, Mr. Bigg, Mr. Crampton, Mr. F. W. Rogers, Mr. Alfred Canton, Mr. Woodhouse, Mr. Lintott, Mr. Rahn, Mr. Vasey, Mr. Sercombe, Mr. Fletcher, and several others; and there is one dentist in the city, Mr. West of Broad st., whom I frequently assisted. The number of teeth or stumps of teeth extracted in these 867 operations has been about 3021. . . . The number of teeth extracted at an operation has varied from one to nineteen. The latter number was extracted by Mr. Canton on one occasion; Mr. Arnold Rogers and Mr. Samuel Cartwright extracted seventeen at one sitting, but these gentlemen and others, as well as myself, have thought it better, as a general rule, to make more than one operation when the number of teeth to be drawn exceeded ten, in order that the mouth might not contain too many wounds at one time, and that the loss of blood might not be very great. A great number of the operations have been for the extraction of the permanent molars, in children about thirteen, as these teeth are very apt to decay at an early period.
>
> I have on 181 occasions, of which I have memoranda, given chloroform for the extraction of a single tooth. . . .
>
> The patients have been seated in an easy chair in all the operations on the teeth, except in a very few cases where a female patient was too ill to sit up. . . .
>
> It is necessary in tooth-drawing to make the patient unconscious, and to continue the chloroform for a little while after unconsciousness is induced, till the sensibility of the upper edge of the eyelid is very much diminished, or almost altogether suspended, otherwise the patient will probably make a resistance that will interfere with the operation, or scream out and alarm his or her friends. I nearly always take about four minutes in the inhalation. It is not desirable to take longer than five or six minutes, as the patient would be slower than desirable in recovering completely from the effects of the vapor. . . . The chloroform has occasionally to be repeated in tooth-drawing before the operation is completed, especially in cases where several teeth require to be extracted. . . . It has occasionally happened that the chloroform has required to be repeated once, or twice even, for the extraction of a single stump. When the chloroform is repeated once or twice it is generally a longer time before the patient is able to leave the dentist's house. I always request the patients who are operated on at the dentist's to drive home, as it is not advisable to walk or use any exertion for an hour or two after the action of chloroform. Indeed, the patient is usually disinclined for any exertion for twenty minutes or half an hour after the influence of this agent, although I have seen a patient mount

the box of a sort of dog-cart, and drive himself away, within five minutes of having several teeth extracted while he was in a state of complete insensibility from chloroform.

I have administered chloroform in a great number of cases for the destruction of the nerves of the teeth. The patient requires to be made as insensible in this operation as in tooth-drawing.

All this—infringing, as it does, almost every canon of modern teaching and practice—reads very quaintly to us; but it should not be forgotten that Snow did valuable pioneer work in anesthesia, and established by experiment the danger attaching to the use of a higher percentage than 2 per cent. of chloroform vapor in air. Snow, in short, realized the importance of the dosimetric problem. This problem has, since his day, been more or less satisfactorily solved, and definite strengths of chloroform vapor can be insured by the use of the inhalers invented by Vernon Harcourt, Waller, or Dubois. These scientific forms of apparatus have not, however, displaced the easy, uncertain, unscientific open method. The dangers are well known. Embley has shown that circulatory failure at an early stage of chloroform inhalation is due to increased excitability of the vagus inhibitory mechanism, that a fall of blood pressure with concomitant failure of respiration is an ever-present danger, and further, that a dangerous fall of blood pressure may be caused by the direct depression of the heart muscle by chloroform. Goodman Levey's researches led him to the conclusion that the chief danger of chloroform is death from ventricular fibrillation, which he finds to occur only in the lightly anesthetized subject; and he believes that the path of safety lies in keeping the patient fully anesthetized and making the administration continuous, which is in consonance with the teaching of Simpson and Syme in the early days of chloroform anesthesia.

The plain man need not commit himself to either theory. Whether death occurs more frequently with an overdose or an underdose of chloroform is of comparatively small moment; the insistent fact is that it may occur with either an overdose or an underdose.

Hill has shown that, as the result of the paralysis of the splanchnic vasomotor mechanism, there is an accumulation of blood in the splanchnic area, the blood gravitates to the large abdominal vessels, forming the "abdominal pool"; the blood supply of the brain and medulla fails; the patient dies of syncope, bled to death by abstraction of blood into his own vessels.

This possibility makes the administration of chloroform to a patient in the sitting position an act reckless to the point of criminality. I would go farther, and say that the man who gives chloroform for a dental operation is either ignorant and incompetent, or is deliberately sinning against the light.

Ether is a far less dangerous drug than chloroform, inasmuch as it never poisons a healthy patient save by an overdose. For many years it was ousted, owing to the powerful influence exerted by Sir James Simpson in favor of chloroform, from the position it deserved as the then safest of known anesthetics. When prolonged experience showed that fatalities with chloroform were at least five times as numerous as with ether, the latter vapor returned to favor with anesthetists. The assumption that it was more difficult to give retarded its more general adoption, which received, however, a great acceleration when Clover introduced his portable ether inhaler. Of late years the use of ether for surgical anesthesia has so increased that it has come to be regarded as the routine anesthetic in surgery. Controversy still continues as to the relative merits of the so-called "closed" and "open" methods; it seems unnecessary to pass any judgment here, inasmuch as the best result is obtained when skill is exercised in either method.

For prolonged dental operations, nitrous oxid and ether, in mixture or sequence, is of proved value, and the nitrous-oxid-oxygen and ether mixture is even better. The recent introduction of intra-tracheal administration opens,

in all probability, a new chapter in the history of ether narcosis.

Ethyl chlorid, though first used in 1848, by Heyfelder, did not come into general use as an anesthetic until the end of the nineteenth century. It had been employed as a spray, for freezing the gums previous to extraction, and Carlson of Gothenburg observed in 1896 that in some of these cases the patient became anesthetized. It soon established itself as a useful drug for short anesthesias, countless inhalers were invented, and all and sundry began to use it. Fatalities began to occur, and the agent began to fall into disrepute.

It has been stated that it is two hundred times as dangerous as nitrous oxid. Ethyl chlorid, like chloroform, can cause vagal cardiac inhibition, and this constitutes its chief danger. I believe that the danger can be avoided by using a minimal dose of ethyl chlorid as an adjuvant to nitrous-oxid-oxygen. The gas is administered first by the method of rebreathing, for five or six respirations; the ethyl chlorid, the dose of which need never exceed 3 cc., is then poured slowly into the bag, and the mixture rebreathed for from 20 to 40 seconds. The preliminary administration of the gas eliminates the risk of vagal inhibition, and the procedure constitutes what is, I think, in the present state of our knowledge, the best method of inducing a single-dose anesthesia to last from 40 to 90 seconds for a dental operation. Nitrous oxid is—or perhaps I should say has been—regarded as the safest of all respirable anesthetics, the only danger attendant on its use being the production of asphyxia.

In 1886 Sir Frederic Hewitt, following up the experimental work of Paul Bert, Claude Martin, and Hillischer, began to investigate the possibility of devising a practical method of inducing and maintaining anesthesia by nitrous oxid and oxygen in mixture at ordinary atmospheric pressures. In this endeavor he was entirely successful; he devised the apparatus which bears his name, and as the result of his experience he laid down the dictum that "There is no form of anesthesia at present known which is so devoid of danger as that which results from nitrous oxid when administered with a sufficient percentage of oxygen to prevent all asphyxial complications."

It is to be regretted that comparatively few anesthetists became competent exponents of Hewitt's method, and that in consequence any widespread and general adoption was so far delayed. Within the last few years, however, great advances have been made. Leonard Hill, Haldane, and Yandell Henderson have made important additions to our knowledge of the physiology of respiration. Yandell Henderson's researches on shock, and his exposition of the theory of acapnia (summarized in his statement that "Respiration is as much concerned with preventing carbon dioxid getting out as with getting oxygen into the lungs") established the method of rebreathing, so ably advocated and practiced by Gatch, on a scientific basis. The work of Gatch, Teter, Crile, Gwathmey, and others gave a most powerful impetus to the diffusion of knowledge on the use of this combination. It formed the subject of a report (by Teter) to the International Medical Congress of 1913, and is one of the subjects on which a report is to be presented at this congress.

I hold the view that the nitrous-oxid-oxygen mixture ought to supersede entirely nitrous oxid alone as an anesthetic agent in dental surgery; and that it is the immediate and urgent duty of all anesthetists and practitioners to become expert in its administration. It is admittedly and beyond question better in every way than nitrous oxid alone. "To him that knoweth to do good, and doeth it not, to him it is sin."

I would it were possible, within the limits of this address, to do fitting honor to recent workers in the field of anesthesia. I must mention two. Crile has demonstrated clinically and experimentally the advantages of nitrous-oxid-oxygen in the prevention of shock, and its value to handicapped patients; his work, too, on anoci-associations marks a great step in advance.

Gatch has established the fact that

rebreathing nitrous-oxid-oxygen for two or three minute periods is harmless and beneficial.

One most notable therapeutic advance is in the direction of the pre-anesthetic exhibition of adjuvant narcotics, such as scopolamin and morphin.

Since Bier, in 1899, injected cocain into the spinal subarachnoid space, spinal anesthesia has been largely employed. It can, however, find no field for its employment in dental surgery.

Much great and good work has been done in the investigation and elucidation of anesthetic problems. The anxiety and responsibility of the surgeon has been relieved and lessened. The immediate comfort and the chance of ultimate recovery of the patient have been greatly increased. The range of surgical operative procedure has been enormously extended. Still, much remains to be done. The "unknown" may hold some drug whose anesthetic virtues far transcend those of any known agent. Till the anesthetist can promise the surgeon a perfect narcosis, as free from danger to life as from immediate or deferred sequelæ, anesthesia will not have reached its ultimate achievement and triumph. Much is left to be yet discovered by research and experiment. In the fight against pain and disease there must be no resting on our laurels. We must press ever forward till victory is assured and complete.

THE TENDENCIES IN DENTAL EDUCATION.

By EDWARD C. KIRK, D.D.S., Sc.D., Philadelphia, Pa.

(Address delivered before the Sixth International Dental Congress, London, at the Central Hall, Westminster, on August 4, 1914.)

WHEN Mr. Herbert Spencer, in 1861, propounded the inquiry, "What knowledge is of most worth?" he startled into critical activity the thinking forces of the entire educational world. Previous to that time, education in a cultured sense was regarded mainly as an adornment, and the inquiry of Spencer caused a distinct shock to the sensibilities of those in whose ideals of education utilitarianism had no recognized place. Within the more than half-century which has since intervened, not only has a complete revolution taken place in educational ideals and methods, but the advancement of civilization and changed standards of living have altered the problems of life so that the objective purposes of education have correspondingly undergone fundamental changes.

Throughout this period dentistry has reacted to the molding influence of the intellectual forces in its environment, and the activities within its own confines have kept pace with the general world-advancement about it, until today, by reason of the stress, both extrinsic and intrinsic, which is shaping the intellectual and educational progress of our profession, we seem to be approaching conditions that may be fairly regarded as marking a critical period in our history, the imminence of which may well make us pause to consider what our future attitude must be if we are to efficiently solve the problems which the demands of modern society cause to press upon us for solution.

DENTISTRY'S ADOLESCENCE.

If we are to measure the age of dentistry in comparison with that of the

mother profession of medicine, I need only call attention to the fact that, as a profession, dentistry has scarcely passed beyond the stage of infancy. Nor do I need in this audience to more than allude to its dual origin: on the one hand as an offshoot from the parent medical tree, and upon the other from the craft of the artizan. From these sources I think we may properly trace the development of the educational curriculum which in due course of time has become the more or less standardized basis of training for the practitioner in our special department of the science and art of healing.

You are all doubtless aware of the effort which was made by the founders of the first organized institution for the education of prospective dental practitioners, in Baltimore, America, in 1839, to induce the administration of the medical school of the University of Maryland to make provision in that institution for the systematic training of dentists, by adding facilities for dental instruction to the medical curriculum, and how the rejection of that proposition forced the fathers of organized dentistry in America to provide for the education of future dental practitioners upon a basis independent of the centers of medical education. You are well aware that similar conditions arose in the early history of dental education in England, with somewhat modified results; and we may trace in the history of practically all civilized countries records of analogous efforts to define in some practical way the relations which in an organic sense should subsist between dentistry and the educational and professional activities of what we call Medicine.

It would be difficult, if not dangerous, for me to attempt to analyze the circumstances which have shaped the solution of this vexed question in so far as it has been temporarily solved in the several civilized countries of the world. Difficult because of the complexity of the problem itself, and dangerous, perhaps, because the attempt would necessarily involve a discussion and analysis of the motives which have been powerful factors in determining the results thus far obtained. Nevertheless an elucidation of the problem before us necessitates a judicial consideration of the principal factors that have determined our position in the past, in order that we may view with some degree of clearness our pathway for the future, and if possible determine what our goal in a professional sense shall be.

"RESPECTABILITY."

Let me in the first place deal directly and frankly with a factor which more than anything else in my opinion has had to do with the shaping of our professional course and determining our anomalous position with relation to the great science and art of healing; and that factor I regard as the question of the respectability of the service which it is our professional life-work to render to humanity.

Respectability may be either of the essence of the thing itself, or it may be altogether a quality in the mind of the observer. Was it not this question of respectability that was the root of the difficulty with which our professional forebears had to contend in their endeavor to engraft dental education upon the medical curriculum? If I am not in error, their request was repulsed by the statement, "Why, if we do this, it will follow that we shall be expected to establish the means of education for horse-doctors, barbers, and the like." As a matter of fact, in the evolution of things, the great science of veterinary medicine has developed such immense and important economic and health relationships that the centers of higher learning of the world have given to that profession the educational standing and recognition it so justly merits.

Medical education in the middle of the last century was meager, and what there was of it was in a chaotic state as compared with its present status. It is not difficult, therefore, to account for the unsympathetic attitude of the medical profession expressed at that time toward dental education in the classic

instance under consideration; nor is it surprising that the respectability of dentistry, both in its professional and social aspects, was in their minds a negligible quantity. It cannot be doubted that the established position of medicine as a learned profession, its distinction in that respect reaching back to the remotest ages of antiquity, has been so generally accepted as to make belief in the sanctity of its position a normal habit of mind—a habit which I might venture to say has become almost hereditary as a human endowment. Hence it has happened that any pretence to a claim for analogous distinction upon the part of a new and recently organized department of the science and art of healing has been viewed askance and with suspicion—somewhat, I take it, as an attempt to appropriate, in part at least, honors and distinctions which by common consent have been monopolized by that profession which we speak of comprehensively as Medicine. In defense of that attitude it has been intimated with more or less emphasis by the representatives of medical thought that the educational training of the dentist suffers by comparison with the greater breadth and thoroughness of education demanded for the successful practice of medicine, and that there can be no equality of recognition or of status without a corresponding equivalency of educational preparation. In short, that the respectability of the dentist suffers by comparison with that of the medical practitioner by reason of the educational weakness of the former.

There have not been lacking, ever since the establishment of dentistry as a profession upon an independently organized educational basis, those who have deeply deplored the outstanding fact that this hiatus between medicine and dentistry was ever permitted to exist, and fair-minded thinkers within the professional ranks of dentistry as well as within the ranks of the medical profession have been battling earnestly with the problem in an endeavor to obliterate the artificial and unwarranted distinction in a professional sense which has been allowed to grow and to continue to exist between the specialty of dentistry and the group of specialties constituting the general field of medical education and practice.

On the other hand, there has continued to exist within the ranks of the dental profession a fairly large proportion of that class who have unprotestingly accepted for themselves socially and their work professionally the unenviable position assigned to them by the critic who has in general impeached their respectability. Of the individual belonging to that class it must be believed that he has not yet arrived at that period of cultural development when he sees with Emerson that "No kernel of nourishing grain can come to him but through his toil bestowed on that plot of ground which is given to him to till." Nor has he achieved that conception of respectability which caused Carlyle to break into Homeric laughter at the definition of this word by a certain witness. Asked what he meant by testifying that a man was "highly respectable," the witness replied that the man kept a gig. "Hereafter let us call it," cried Carlyle, "not respectability, but gigmanity."

DENTISTRY AND MEDICINE.

It is, I take it, a natural result of the discovery of the importance of the mouth cavity and its contained organs and tissues as related to bodily health, by those who have thought deeply on these problems, that there should have been created in their minds a respect for the possibilities and usefulness of dentistry in the service of humanity such as has compelled their unflinching loyalty and devotion thereto, and has eliminated all concern as to what the opinion of the uninformed may be. It is this group that has not concerned itself with the vexed problem of the organic or official relationships which dentistry shall or ought to bear to organized professional medicine, for they have been willing to carve out the ideal of their professional future and to construct the edifice of their professional habitation from the material furnished by the data of their

calling, and to content themselves with the service to humanity which they can render.

Apart from the influence which the factor of respectability has exerted in tempting many to acquire the medical qualification as an aid to the successful practice of dentistry, it is to be recognized that there is an important group of men in the dental profession imbued with the necessity for an extent of training and culture that would enable them to efficiently deal with the problems arising in that borderland in which the practice of dentistry and medicine imperceptibly blend. It is this group that has made the sacrifice of time, energy, and money to more efficiently qualify themselves for their specially selected field of activity; but what I wish to particularly emphasize is that the men so imbued, notwithstanding the fact that they are holders of the medical qualification, are, and always have been, practitioners of dentistry, using that term to designate inclusively the entire field of activities which are generally conceded to be legitimately within the sphere of the dental practitioner.

It is significant that from the beginning of the history of organized dental education it has been clearly, if not generally, recognized that the vital relationships of our professional work demand for the practitioner a kind and extent of preparation that necessitate an educational curriculum which shall train the prospective dentist adequately in a knowledge of the composition, structure, and function of the human body both in health and in disease.

Herbert Spencer's inquiry as to what knowledge is of most worth applies more pertinently at the present time in a practical sense to the problem of dental education in its relation to medical education than it did when first uttered, for the forcible reason that the data which have been developed from scientific investigation and discovery in the field of the healing art have developed beyond individual human comprehension. It is probably safe to say that the period has finally passed when another such book as the "Synthetic Philosophy" could be written. The data upon which Spencer based his monumental work were insignificant in bulk as compared with the mass of knowledge which has since accrued owing to the extension of human investigation in every direction.

So it is, also, in all departments of human knowledge, the science and art of healing included. It has therefore become physically impossible for any single human mind to grasp intelligently more than a small fraction of it, and being so, one must be content with an intimate knowledge of some special field and an extremely cursory bird's-eye view of the general remainder. The consequence is that medicine, using that word in its general application, has inevitably become divided into numerous special departments, each requiring as much time and attention as was formerly given to all that was then known of medicine.

The same influences and the same conditions have enlarged the bulk of data which form the essential of dental education, so that the economic factors of time and human energy are irresistibly determining practical limitations to the scope and extent of educational preparation that may be properly demanded of the practitioner of any department of the healing art; for which cogent reason it seems that we must necessarily look forward to a time in the near future when the entire system of medical education will be reorganized on lines fundamentally different from its ancient basis. No medical student, I venture to say, feels that he is competent to enter upon the general practice of medicine after having received his official qualification until he shall have first had a reasonable period of graduate training in hospital residence or otherwise: and what is true of the practitioner of general medicine —if indeed any such really exist, in the older sense in which that term was originally used—is more particularly true of those who specialize in any of the recognized departments of medical and surgical practice.

THE CURRICULUM AND THE LIFE-WORK.

These well-known facts are merely practical evidences of the underlying truth that the classic curriculum in medicine does not, as now arranged, adequately equip those who pursue it to safely and efficiently take up their life-work. Moreover, the classical medical curriculum is defective in the respect that while insufficient for the needs of the specialist, it contains courses which it is not essential that the specialist should follow. In short, the curriculum of medicine is not at present adapted to the fulfilment of its avowed purposes. It is these facts that stand as obstacles to the practical utilization of the standard medical curriculum as a means, or in a collective sense as any part of the means, for the efficient training of the practitioner of dentistry.

With the dawn of the science of bacteriology following the investigations of John Tyndall, Louis Pasteur, Sir Joseph Lister, Robert Koch, and W. D. Miller, the death-knell of the idea was struck that teeth could be considered inert matter and treated as such. Dentistry began to realize in a very practical way that the masticatory organs and mechanisms are not a machine, but organs possessing such sensitive and responsive vital relationships that, quite apart from their masticatory function, the question of their normal integrity involved relationships not only of bodily well-being but of life itself. So also the investigation of the microbic flora of the oral cavity begun by Anton van Leuwenhoek in 1675, and followed in our own time by the work of Leber and Rottenstein, Milles and Underwood, Vignal, Gallippe, Vicentini, Miller, Black, Goadby, and a host of others, has brought out the fact that the human mouth is not only the principal portal of entry for bacteria, but a breeding-ground or incubator in which may flourish the majority of the pathogenic micro-organisms that create various disease reactions in remote parts of the human body. The dental profession has been proclaiming this general fact since its first discovery, and has reiterated the importance of oral hygiene so insistently that we have at last obtained the sympathetic attention of the medical profession of the world at large, with the result, among other things, that study of this important question has been taken up by medical scientists whose confirmatory revelations have followed in such rapid succession as to cause profound astonishment and a demand for more light on the problems of oral hygiene.

DR. HUNTER'S INDICTMENT.

The revelations of Hunter as to the extent to which foci of infection in the mouth are responsible for metastatic lesions and systemic disease reactions furnished unimpeachable evidence, first as to the seriousness of what had previously been looked upon as almost negligible mouth lesions, and secondly evidence as to the harm that was being done to bodily health by the performance of badly designed and ignorantly executed dental restorative operations. The general recognition of the pathogenic relationships of the infected mouth, and the insistence that these fertile sources of ill-health shall be removed, is having its natural reflex effect upon the general problem of dental education. The demand from all quarters today is for men so educated that they shall be competent to efficiently deal with such questions as I have herein referred to.

Briefly stated, the dental profession has asserted that the infected human mouth is a fertile source of bodily disease; the medical profession has examined that question and has agreed that the assertion is true; and the general public now asks what is to be done about it. The only valid answer that dentistry can practically make is to so educate its practitioners that they shall be competent to eradicate the evil complained of.

At a meeting last year in Chicago Dr. Charles Mayo epitomized the situation by saying that in his judgment the next great step in preventive medicine should come from the dental profession. The only question is, Will the dentists take that step? It must be taken by the

dental profession, otherwise the dental practitioner is faced with this rapidly developing situation: His own patient for whom he has done elaborate restorative work falls into the hands of the medical adviser for the relief of a systemic difficulty which may have its septic origin in the mouth. The radiograph reveals the primary focus of infection about the tissues of a tooth-root which may be doing service as an abutment for an elaborate and extensive prosthetic restoration. The medical man, with incomplete knowledge of the resources of dental practice, especially upon the therapeutic side, may order the removal of the focus. In matters of health the formal judgment of the medical adviser is final, and the patient is referred back to the dentist with a peremptory order to remove the diseased abutment. No argument or protest will serve to neutralize the force of medical opinion when health is the issue. Our only safeguard against such an unfortunate occurrence is so to improve our educational foundations that our work will not be open to such justifiable condemnation.

THE RATIONAL SOLUTION.

For the reasons I have already given, it is my personal opinion that because of the practical impossibility of combining the present medical curriculum with the present dental curriculum so as, in view of the present economic conditions, to train the dental practitioner to the best advantage, our obvious course is so to enlarge the scope and improve the character of the special dental curriculum as to adequately meet modern educational demands. This course should be followed until the time arrives, as I believe the time inevitably will, when there shall be brought about, by the specializing tendency evident in medicine today, a reorganization of the medical curriculum by which sufficient length of time will be devoted to the training of men in all of the sciences that are fundamental to the entire field of healing, at the termination of which phase of the curriculum there should be granted a mark or degree educationally equivalent to the bachelor's degree in science or letters, and from the point of attainment of this bachelor's degree in medicine the student may specialize in groups of studies that will make him an efficient practitioner in some recognized special department of medicine, at the termination of which he will have conferred upon him his doctorate or licentiate, and then be licensed to practice only within the limits of the specialty for which he has been trained. Should he desire the right to practice an additional specialty, it should be required of him to prepare himself by further additional work in any special department, and then secure a license which will permit him to practice in that department; and so on.

Dentistry has already within its organized curriculum practically all of the sciences fundamental to the healing art. If such a reorganization of the medical curriculum as I have referred to shall ultimately arrive, then dentistry will be fully equipped and qualified to take its place and rank along with the sister specialties of the healing art. It seems, too, that the tendencies in dental education today are toward such a consummation. It is a consummation devoutly to be wished, and when it shall arrive it will usher-in an era when there will be fewer exhibitions of ignorance of medical matters upon the part of dental practitioners, and a corresponding minimizing of the ignorance of dental matters by medical practitioners, both of which types of ignorance, it is becoming more and more evident, are at present the fruitful source of untold human disease and suffering.

THE PHYSICAL AND PROSTHETIC RELATIONSHIP IN RESTORED CARIOUS TEETH.

By H. C. REGISTER, M.D., D.D.S., Philadelphia, Pa.

(Read before the Susquehanna Dental Association of Pennsylvania, at its annual meeting, Delaware Water Gap, Pa., May 26, 1914.)

"THE Good Ship Earth" is the title of a book I recently read, and the author thinks the good ship upon which we sail through space, around its solar lighthouse, has been *en voyage* for over a hundred million years, and will continue to sail on for as long a time again. In this stupendous space of time, the history of the earth and its people is confined to glimpses of its early civilization dating back not more than four thousand years before the Christian era. According to our chronology, only for six thousand years has an imperfect log been kept, while the good ship Earth has pursued her voyage through a sea of millions of years of time.

Our earliest knowledge of civilized human activity upon the earth is associated probably with the island of Crete. The Cretan race gave origin to the early Grecian race, and they are supposed to be coincident with the first dynasty of the Egyptians. Their implements and temples, however, show prehistoric data that antedate the Egyptians. These ancient races had no knowledge of each other in their early history. In a limited way, it has been historically shown that dental caries was more or less prevalent with these races, as it probably was with the barbarian races of the earth in prehistoric times.

The idea that the loss of the human teeth through disease may cause an edentulous race is the height of folly. All animals requiring teeth are histologically types unto their kind. This principle involves an anatomical construction suited to the functions essential for their use, and it extends to their bony base and muscular attachments. The discontinuance of these would alter typically the whole animal, not only in its food relation, but also in its physical form, the teeth in this instance being primarily the pivotal point upon which these anatomical conditions depend.

EARLY KNOWLEDGE OF DENTAL DISEASE.

Interesting specimens of dental art have been found in Egyptian tombs, and a few rare specimens have been found in the tombs of the early Phœnician and Etruscan races of later date. The Phœnicians were a part of the early Cretan or Grecian race, made so by conquest, and were absorbed into that people, as the Etruscan race was absorbed by the early Romans.

The specimens of dental art used by those early races were confined to the stringing or tying-in of human or animal teeth, or teeth made of wood, to take the place of those lost, and were purely esthetic efforts. The finding of teeth filled with gold in Egyptian mummies is only problematical. Specimens of artificial teeth, however, have been taken from the Egyptian, the Phœnician, and later the Etruscan tombs. The specimens which are being shown in the museums of Europe are positive proof that dental work was done several thousand years ago.

We have no authentic knowledge of any literature in regard to tooth troubles earlier than the fifteenth century, other

than that from the Egyptian priests, who speak of the teeth giving pain. This condition was conceded religiously to be the sequel of an offense to one's god, and the sufferer had to do penance through this physical suffering.

Dr. Kirk has in his possession an old German work published anonymously in 1530, which is supposed to be the oldest dental publication. He says, "The original of this is part of my private collection of dental literature, and constitutes probably the oldest record, at least in a separate dental publication, of a theory of dental decay, which doubtless had its beginnings in the remotest antiquity, and which in its essential features expresses the theory of dental caries generally held today. The translation of the paragraph referred to is as follows: 'Caries is a disease and defect of the teeth in which they become full of holes and hollow, which most often affects the molars, especially if one eats and does not clean them of the adhering food, which decomposes, producing a bad, acid moisture which eats and corrodes them out, increasing continually little by little so that it destroys the teeth entirely, which thereupon finally rot away in pieces, not without pain.'"

THE DISCOVERY OF MICRO-ORGANISMS.

In 1663, a hundred years after this work was written, the discovery of micro-organisms was made by Anton van Leuwenhoek, a linendraper by trade, living in Amsterdam, Holland. He had a hobby for making lenses, and is known as the Father of microscopy. Leuwenhoek published his investigations in the *Transactions of the Royal Society*, London. In part, his contribution is produced here in his own words in order to show with what remarkable exactness he recognized the existence of bacteria at that early date. The wonderful microscopic conditions of the mouth shown by his imperfect optical methods are quite in line with the work of our day. Considering this subject, he wrote as follows:

Although I keep my teeth very clean, yet when I look at them with a magnifying glass, I observe in the spaces between them a white mass which looks like moist flour. I mixed this substance with some saliva and rain-water which contained no bacteria, and observed under the microscope that this mass contained minute living organisms which only rarely showed movement. I was able to distinguish three varieties of these micro-organisms. The largest were present in the smallest numbers, but their movement was equally as strong and active as that of a white pike swimming in a lake. The smaller micro-organisms existed in large numbers, and were characterized by a skipping movement. The third and smallest variety were partly oval and partly round in form, and moved with the agility of a swarm of flies which were wildly dashing to and fro in a small inclosed space. Aside from these forms of micro-organisms, I also noticed a number of striæ and threads of varying length, yet of equal thickness, some of which were straight and others curved. They lay upon each other, and seemed to possess neither motion nor life.

The study of bacteriology may be said to have its beginning from these observations of Leuwenhoek. The pathological relation, however, of these unicellular, vegetable micro-organisms, did not associate itself with medicine until later years, medical and scientific men generally being all at sea as to their origin and effect. The two general conceptions, during many years, were first that micro-organisms germinated spontaneously, or that they were biogenetic, and second that they were sequelæ of disease. Little attention, medically speaking, was given to the subject as a cause of disease, until Pasteur, the French chemist, made the important discovery in 1850, about two hundred years after Leuwenhoek's discovery of micro-germs, that the putrefaction of beer and the souring of wine were related to micro-organisms as a cause. Later he in association with his students Pallender and Devinel, saved millions of dollars to France by destroying the bacillus Pebrini, the enemy of the silkworm, and the anthrax bacillus, so deadly to sheep.

Pasteur's discoveries led to Lister's early antiseptic operations in surgery;

also to a scientific classification of bacteria that is still being developed, and which may, through the etiological association of bacteria with disease, and our ultimate acquaintance with their activities and effects, lift hygiene to the dignity of an exact science.

THE CHEMICO-PARASITIC THEORY OF DENTAL CARIES.

In 1835 Robertson stamped his theory upon the dental profession that caries was caused by chemical decomposition of food, his ideas being similar to those held in the fifteenth century, as stated in the anonymous volume quoted. In later years Milles and Underwood held to an acid theory, but without focalizing its inception. Black, Williams, and Miller have placed their final stamp upon the origin of dental caries as being a chemico-parasitic condition, which is now generally accepted, *i.e.* the fermentation of carbohydrate material in the presence of acid-forming bacteria, resulting in the formation of lactic acid, first destroying the enamel cuticle through the formation of plaques upon the teeth, then attacking the interprismatic substance of the enamel prisms, allowing the prisms to fall apart, and the bacteria then filling the dentinal tubuli, destroying the contents and basis substance of the dentin by acidulation. This was supposed at one time to be due to a single species of germ influence, the leptothrix buccalis.

The new school now generally accepts the views given by Black, Williams, and Miller's of later date, whose observations showed a large variety of micro-organisms to be acid-producers. The theory of dental gangrene or inflammatory condition, or of any internal physical condition or influence, is set aside.

The latest word regarding the predisposing causation of caries is said to intimately relate it with the chemical composition of saliva. The theory of the presence of potassium sulfocyanate in the saliva being associated with immunity to dental caries is also now given up.

In a paper, read before the Toronto Dental Society in November 1913,* Dr. Kirk takes up the latest association of saliva contents with caries, saying: "The suggestion had been made to Miller by myself and in my published articles . . . that susceptibility to caries might possibly be conditioned upon the presence in the saliva of a dissolved carbohydrate, the product of metabolism, and not wholly upon the débris of alimentary carbohydrates in the mouth. This suggestion was rejected by Miller after he had made some experiments to determine the possibility of the occurrence of a metabolic carbohydrate in the saliva. It will readily be seen that the scientific confirmation which the researches of Miller gave to an easily understandable and widely accepted theory of tooth decay served to fasten almost indelibly upon the minds of all the belief that caries of the teeth is produced by fermentation of adherent food particles, and it is equally clear that belief in that view of the case has become the parent of the axiom that 'Clean teeth will not decay.'"

Again, "It is also known from wide clinical observation that dental caries is not necessarily a filth disease. Some teeth kept as clean as patient and dental operator can keep them will decay, and decay recurrently. Other teeth in mouths into which the tooth-brush has never entered, and which are offensively filthy, do not decay, albeit they may show other manifestations of a pathological character. Our theory of the etiology of dental caries must therefore be sufficiently comprehensive to fairly explain these peculiarities, otherwise we have not arrived at the whole truth about dental caries."

The present trend in original research work in uncovering the etiology of dental caries seems to be confined to the external parts of the tooth, *i.e.* confined to its environmental atmosphere. Its physical or internal processes are held

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* See DENTAL COSMOS for January 1914, vol. lvi, p. 1.

to be in nowise associated with the production of caries.

In an elementary way let us look at the inside of a tooth, and see if there could be a possible physical influence exerted internally, and thereby associated in some way with its environment externally.

THE FORMATION OF A TOOTH.

The teeth develop from two sources that centralize their formative processes at the dento-enamel junction. On the enamel-forming side of the tooth papilla lies the enamel germ, or organ forming the ameloblastic cells, which are the enamel constructors. In direct contact with the tooth papilla on the opposite or under side cells are formed with nuclei, which are the odontoblastic or dentin constructors.

The formative growth of enamel is outward, its prisms being built up in hexagonal columns or prisms that are supposed but not known to be homogeneous, and are transparent. These prisms are built up in a network of interprismatic cement called "the cortical substance of Walkhoff," and unite the prisms into a solid structure. This cementing material is considered by some writers to be inorganic, by others to contain considerable organic matter. According to Van Ebner and other investigators it contains four per cent. of organic matter, and can be easily stained in early life. The enamel prisms, as a rule, radiate at from a right angle to an acute angle from the dento-enamel joint to the periphery of the crown. The enamel organ terminates itself by absorption in the completed enamel cuticle. The dentin, which in some respects resembles bone, constitutes the chief structure of the tooth. It is confined in a completely protected envelope by the enamel covering of the crown and the cemental structure covering the root.

The latter structure is in immediate relation with the tooth ligament, otherwise the pericementum. The fibers of this membrane attach themselves at one end to the cemental covering of the root, and the opposite ends of the fibers are attached to the periosteal covering of the alveoli. This anatomical arrangement constitutes the gomphosis tooth joint, the tooth being held in its socket on its longitudinal axis by the fibers circling around the root.

The dentin is a complex structure. As before stated, its development commences on the under side of the tooth papilla, and in the opposite direction from that of the enamel. In other words, the enamel tissue growth develops outward and the dentin inward, but they unite in their initial construction at the dento-enamel space, and the internal structure of the tooth is thereby made complete.

In degree of density, the dentin is about midway that of enamel and cementum. The odontoblastic cells are the builders of the dentin and its contents, and the pulp and its connections. The dentin, as it is formed by the odontoblasts by their excreting protoplasmic calcified material at their periphery, draws toward the center or inner side of the forming tooth. Thus the dentin forms into a complex physical structure that anatomically unites at its periphery with the enamel and cemental envelope. The calcified mass of dentin constituting the basis substance is made up of hollow tubes about three or four microns in diameter. These main branches divide and subdivide, and anastomose; they radiate in a spiral direction from the pulp cavity to the periphery of the dentin. These tubes are filled with the fibers of Tomes; they are the dentinal fibrillæ, and are odontoblastic elongations arising from the odontoblastic layer of the pulp, which have retained their function for carrying nourishment to the dentin and interprismatic substance of the enamel through metabolic influences. They also are probably associated with a true nerve system distributed in the dentin, and carry the impressions of pain or thermal impressions. They are surrounded by sheaths called after Neumann.

As to just what is the anatomical

structure of the fibers of Tomes opinions differ. Their exact structure or nature has not yet been shown in a satisfactory manner; that they permeate the dentin primarily in a direct radial course, divide and subdivide, reach the enamel, and are lost in pear-shaped terminals, has been shown. Römer and Morgenstein believe these to be nerve-endings, while some other investigators question their conclusions.

The odontoblastic cells, having completed the building-up of the dentin matrix or basis substance, transform the dental papillæ into the dental pulp, undoubtedly, to my mind, intended for the physical upkeep of the organized tissues of the teeth. The vital function of the pulp is essential to the physical longevity of the organ.

The dental pulp is the life center of the tooth, and should always be retained if possible. By its loss the dentin becomes dead dentin, which means an absolute loss of the living protoplasm which associates itself with all living tissue. When the pulp is lost, a degeneration of the physical properties of the matrix is soon in evidence. The rawness or exposed vital aspect is gone, and the dentin, according to Noyes, is in the same condition as necrosed bone, in which the bone corpuscles have been killed.

In an academic way I have gone over the formation of a tooth to emphasize the wonderful anatomical construction of the organ, and, naturally, the physiological sequence provided for by such a delicate internal mechanism, and have pointed out some of these physiological actions and reactions shown when this organ comes to us for treatment under pathologic conditions.

I am strongly impressed with how little we know regarding the normal physical processes that are going on in vital teeth all the time, such as tooth metabolism, or their structural maintenance, the anticipation of their diseases generally, or the cause or cure of dental caries especially.

Of the several diseases that attack and destroy the human teeth, we find dental caries, pyorrhea or alveolar osteomyelitis, and erosion, to affect most people, and to be most destructive in their character. Of these diseases, tooth caries is the most general. These diseases are known to have been general with the early Egyptians, and from prehistoric skulls are probably as old as the human race.

The statements I propose to make will be, in the main, negative as affecting the etiology in our present knowledge of dental caries, and affirmative as to some methods of tooth restoration and control of caries.

Accepting the mutability of the teeth in its broadest sense, I am inclined to believe that local metabolic changes take place in the interprismatic substance that make it possible for bacterial activity to break down this substance.

THE RESTORATION AND RECUPERATION OF CARIOUS TEETH BY MECHANICO-PHYSICAL MEANS.

If I were asked what is the most important effort in dental or stomatological practice, I should undoubtedly say it is the restoration and recuperation of the human teeth to health and functional usefulness, after they have been attacked and more or less destroyed by caries; in other words, the restoration of the teeth to functional form and protection by mechanical or prosthetic means. Through this protective influence their recuperation to approximately normal physical condition is made possible, *i.e.* a cicatricial healing is induced of the raw, primary dentin by calcification of the fibril terminals and their matrix through the metabolic process from within, producing secondary dentin. In all operative work upon the teeth for the cure of caries, the effort to bring about this result should be made the foremost consideration. I believe it is possible, and is done in thousands of cases in which we build better than we know.

In the first place, we must fully appreciate and recognize the fact that caries of the teeth is a specific disease that creates an altered condition of the

tooth tissues, and is undoubtedly one of the most general morbid conditions affecting the human race. And this disease cannot be cured by mechanical means *per se,* but by mechanico-physical ones.

We use the word "cure," but not often the word "recuperate"; in their relation to the teeth both words mean the same thing, the latter including the process of getting well. The word "restoration" used in connection with the curative processes of caries implies protection of the dentin. Absolute protection of the dentin and enamel is essential for enamel maintenance and dentin recuperation. The terms usually used, such as "filling," "stopping," or "plugging," do not embody the essentials of the physical problem involved; they fail to express a treatment. The word "restoration" at least tells us what we are striving for. The operator restores the tooth to functional contour, and gives protection from external environment and its influence upon the raw tissues by mechanico-therapeutical protection; and the tooth recuperates itself through its own physical energy, *i.e.* the formation of secondary dentin.

NATURE'S PART IN THE REPARATIVE PROCESS.

If we consider the physical relations upon which we are working, we must disabuse ourselves of the idea that the efforts to save teeth begin and end with simply closing a hole in a tooth. The physico-mechanical treatment of the raw dentin must be such as to permit nature to repair that tissue. The idea I wish to express is that if dentin and enamel have been attacked and destroyed by caries, the remaining tissues can be so protected by restorative procedure as to permit the basis substance of the dentin to change physically its diseased or altered condition. Vital dentin cannot remain in a raw condition. In other words, the raw surface of the dentin, when properly protected, passes through a natural healing process of calcification of the end fibrils, forming secondary dentin, or we have the end fibrils losing their vitality, followed by disintegration, and a renewal of caries will soon put the tooth on "the ways" again for repair. We see this loss of vitality and waste of the dentin where erosions are present. From clinical observations I am convinced that the interprismatic cementing substance of the enamel prisms are in immediate communication with Tomes fibers, and that organic material in the living organ reaches the enamel in this way. Clinical work shows the change that takes place in these tissues by the absence of the pulp relations. This physical change alone would cause me to accept the mutability of teeth.

In conformity with these impressions, let me quote Dr. Theo. von Beust of Dresden, Germany, who has made some interesting experiments upon the vitality of the enamel tissue, as set forth in an article written by him (DENTAL COSMOS, February 1914, page 201) in answer to a paper by Professor Pickerill:

> Nitrate of silver will penetrate the enamel vessels in the manner described by me about as well as any other stain. Proof: The root of a freshly extracted tooth is sawed through about midway between the apex and crown, and the root and pulp cavity enlarged to receive the end of a glass funnel or pipet. The surface of the root is superficially ground—up to the enamel line—and the sawed end and ground surface shellacked, care being taken to prevent the varnish from reaching the inner part of the pulp cavity or surface of the crown. The funnel containing a wire is now sealed into the tooth with sticky-wax, allowing the wax to spread over the shellacked part of the tooth. After the wax has cooled, a few drops of water are placed in the funnel, and the wire is withdrawn—to exclude the air. One per cent. nitrate of silver in aqueous solution is now added, and the specimen is placed in the dark. After the lapse of a few days, the teeth are ground in paraffin oil, and the sections are wiped and placed in a bottle containing dilute alcohol. The bottle is now placed in the sun until decomposition of the salt has taken place, whereupon the specimens are passed through strong and finally through absolute alcohol. to extract the water, washed in xylol and embedded in balsam. Microscopical examination discloses the fact that the silver solution

has followed the dentinal tubes, and permeated all uncalcified tissue of the enamel—*i.e.* the capillary spaces. . . .

These canals are, in my opinion, identical with the sinuosities to which the name spindles and tufts have been given. They certainly stand in direct communication with the dentinal tubes. My experiments verify the view expressed by Professor Pickerill that these "interprismatic spaces" are continuous, and show, moreover, that all other spaces in enamel are parts of one great system. That their origination is the result of "imperfectly acquired function," however, I do not believe. These canals are found in all teeth, including the teeth of the anthropoid apes raised in their native habitat. Their occurrence is so general and their morphological uniformity so constant that anyone about to grind a specimen can as logically expect to find the characteristic appearances produced by the presence of these capillaries as an accoucheur would expect to find fingers and toes on a babe being born.

The continuity of pulp, dentin, and enamel relation is here shown beyond question.

EFFORTS AT DETERMINING THE ETIOLOGY OF DENTAL CARIES.

The three most destructive diseases of the teeth and the alveoli that I have mentioned continue to remain unknown as to their etiology. There is still much guessing, and many hypothetical conclusions remain. Even after the stupendous work done by such recent investigators as Miller, Black, Williams, Kirk, Truman, Hopewell-Smith, Andrews, Michaels, and a number of others, no one yet has lifted the veil that hides the cause or causes of these dental diseases; no one has shown what dental caries is, whence it comes, and what is the *modus operandi* by which it is allowed to take possession and defy control. These problems seem only a little nearer to solution than they were in early history.

What we know, if anything, about tooth caries is its association in some way with microgerms, and these may be associated in some way with the physical properties of saliva. All the investigators named have pretty well demonstrated microbic influence as a factor, but there the exposition stops. Just how caries originate—whether by the chemical action of nascent lactic acid, produced by microbes alone, protected under a gelatinous plaque, or associated with some obscure condition of the saliva as found in its composition, or perhaps, and I think probably, by influences of the physical metabolism of the organ itself—we do not know. All of these and other unknown influences perhaps constitute in one subject immunity and in another susceptibility. It seems almost a parody!

IMPORTANCE OF THE VITALITY OF A TOOTH AND THE FORMATION OF SECONDARY DENTIN.

There is associated with this obscure condition the word "vital," and this word applies to both the tooth and its bacterial environment. So far as we think we know, the microbic influence producing dental caries is chemico-parasitic, *i.e.* it is an acid—supposedly lactic—produced by the activities of one or several bacteria. To my mind this is only a part of the problem. It is, however, a great gain to establish its association as a factor. We have to treat teeth normally vital, subnormally vital, or partially vital; no dead teeth are tolerated or held in the alveolus. We often hear of surgical operations successfully performed, but the patient dies. The technique was all right, but the patient failed to recover. Now let us associate this idea with the teeth. What is the preservative or curative percentage of tooth restorations, or so-called fillings, covering a single treatment of caries for a period of ten years? I think twenty per cent. would be excessive! Is this success? A part of the twenty per cent. may be called successful, inasmuch as a few teeth have been restored to usefulness and retained for half a century or a longer time. If this can be said of a few cases, greater knowledge will make it possible for many.

The restoration of a tooth diseased by caries in nowise differs in its cura-

tive possibility from operations performed on other parts of the body. Many authors and practitioners hold that the teeth are only passively vital, and this limited physical association is confined to the pulp and dentin. This conclusion excludes the metabolic influences which, to my understanding, must be ever present in vital teeth. Conclusions from many examinations made clinically show that vital teeth are really restored to health only when the mechanical treatment acts upon vital tooth tissue as a therapeutic protecting agent, viz, by the production of secondary dentin.

Where perfect protection is made, raw vital dentin practically heals. A new tissue is formed, closing the tubuli and calcifying the fibril terminals usually colored with pigment matter. I have seen this physical change in hundreds of cases. We see it when the enamel is lost by mechanical attrition, and in many cases of failure—my own, of course—where much of the tissue in the cavity shows recuperation, and other parts show recurrence of decay.

While we do not know just what caries of the teeth is, we have a possible relief, at least for a time, by protecting the raw tissues of the tooth from germs. The protection given to carious teeth is surgical and therapeutic only so far as its influence bears upon the physical change in hardening the dentin. Thus in restoring the teeth to their contours by prosthetic means, for functional purposes, we also give to the raw dentin a protection, thereby permitting the fibril endings and basis substance to form the subnormal hornlike tissue that terminates naturally. This undoubtedly takes place more or less perfectly in most carious areas operated upon, even when the service is indifferently done. This is as far as the tooth can restore itself.

No organ has the power to reproduce or recreate its functional self after being more or less destroyed by disease. The liver, the skin, or any organ may be destroyed in part by a wasting disease or a surgical operation, and the remaining part of the organ recover, but what remains is only part of a liver, or skin without hair follicles or sebaceous glands. Teeth differ only relatively in this respect from other organs.

The loss of the normal protection of a tooth, viz, the enamel, practically places the dentin in a raw condition, and this exposed surface of dentin should receive consideration other than that which might be applied to an inanimate non-responsive substance. The aim or effort in restoring the teeth should be (1) to maintain and retain their internal physical process as near to normal as possible, and (2) to restore the lost parts by prosthetic procedure along lines of contour consistent with the physico-mechanical reproduction of the tooth. Restorations thus made meet all requirements in calling forth a vital response, and the restoration of contour not only meets the required restored function, but also anticipates as far as possible recurrence of caries from any exciting environmental influence.

THE UNTOWARD INFLUENCES OF DEVITALIZATION UPON A TOOTH.

With the devitalization of the pulp all these foregoing conditions and processes cease. The pulp, dentin, and enamel substance become inanimate or dead matter.

The tissues composing the dentin are about thirty-three per cent. animal matter, the other two-thirds are inanimate, basic lime salts. The devitalized animal matter of pulp and fibrillæ in the dentin undergo rapid putrefaction when exposed to the mouth environments.

The preservation of devitalized teeth contemplates protection both against the bacterial action of caries and against its disintegrating process, or the natural dissolution of the dental tissues. The devitalized tooth immediately begins to be destroyed by its own insufficiency—in other words, by the loss of its life principle. We fully realize that devitalized teeth may be held comfortably in service for many years, but they are doomed even under the best condi-

tions and treatment. The crown is disintegrated sooner than its root. The reason for this is that the tooth continues to receive a semi-vital sustaining influence through its intimate relation with its vital cementum and pericementum—these tissues remaining normal after the pulp is removed.

There is undoubtedly an endosmotic, semi-vital, protoplasmic influence extended to the dentin of the root through endosmotic action after the pulp is gone. This explains why the pulpless root gives longer service than its lifeless crown. It is quite plausible to accept the fact that all teeth are practically the same in their chemical composition, but the vital influences predominating in different teeth must constitute the difference between "hard" teeth and "soft" teeth. It is the life force which animates the tissues in teeth that makes them seem different; and they *are* different in this relation. Vital relations and impressions differ in degree of intensity in different people.

In the prosthetic relation of carious tooth areas a great many influences for and against are to be considered. It would be impossible to go into this part of the subject in an extensive explanatory way in this paper, that division being a volume of itself.

MECHANICO-PHYSICAL CONSIDERATIONS IN TOOTH RESTORATIONS.

It is not my intention to go very deeply into the technique of restorative constructions, but let us see if there is not a vital response made by the tooth in its behavior toward the prosthetic restoration, and if there is a physical response from the tooth meeting the operative effort in giving the carious part artificial protection. It seems to me that this effort should receive first consideration in operating upon carious teeth. I have often thought that the dental profession, in unraveling many of its problems in operative constructive work, has placed the cart before the horse, and the poor animal is pushing a load without seeing his way clearly. The fact that a tooth can be worked upon mechanically is no reason why its beautiful and wonderful tissues should be ignored. If the team were geared up in a natural way, placing the physical relations first and the mechanical last, our profession, in my judgment, would not only meet with more permanent success in saving teeth, but also would be placed in its true position before the laity as a healer in this special field of medicine.

Carious areas are so varied that we will confine our remarks to cavity formation, with the idea of considering the tooth cavity from its physical as well as its mechanical aspect. The enamel part of the cavity wall should receive a form that retains the prisms in their whole length if possible, and thereby insure their greatest strength mechanico-vitally. This applies also to devitalized enamel, although much of its physical strength is gone.

THE PLACING OF RETENTION FOR FILLINGS.

In vital teeth, the interprismatic substance and the enamel prisms should remain meshed into the dentin and its tissues at the dento-enamel joint. This means continued vital support of the enamel, and prevention of the enamel prisms failing at the restored prosthetic contact. For anchorage of the filling material, the enamel should not be undercut at the dento-enamel contact. The cavity wall at the dento-enamel contact should be kept physically intact with the dentin, if possible. If the enamel is undercut at the dento-enamel junction the enamel prisms are severed, also the enamel interprismatic substance or enamel sustaining sheath is cut away, thereby devitalizing an area of enamel at the contact of the prosthetic protection. The enamel walls should be cut or formed at their natural prismatic joints to meet all retaining devices made in the enamel. By this procedure we retain all natural unions of mixed tissues from pulp to enamel, and thereby retain the metabolic energy that distributes the protoplasmic influences

which reach all the remaining parts of the tooth.

If retaining devices for prosthetic retention are placed in the enamel only, they should form an open dovetail in alinement with the prisms. The dentin is the best foundation for retaining devices. The anastomotic vital sources of the dentin will always meet a fair undercut, and will continue to take care of its tissues.

PREVENTION OF THERMAL SHOCK.

Teeth are restored with a foreign substance, and this substance is generally metal.

When numerous fibril ends, as found in the exposed tooth cavity, are brought in contact with metal, the thermal shock conveyed to the pulp should be anticipated as far as possible. While a slight thermal irritation stimulates the odontoblasts to push forward into the raw fibril endings a calcic healing lymph, thereby creating secondary dentin, excessive irritation through metal conductivity may change a normal condition into one that is pathological by overstimulation of the pulp function. When excessive, acute hyperemia follows the introduction of large metal restorations, it is best to remove them, and resort to a protection of the dentin that gives the least thermal shock through change of temperature. If a tooth is treated in this way temporarily for a few months, a deposition of secondary dentin occurs, after which a protecting metal filling can be borne with perfect comfort.

To prevent hyperemia, which manifests unpleasant, painful, and at times destructive influences upon the pulp of the tooth through an acute excitement of the fibril terminals, the exposed dentin should receive an insulation before restoring the lost portions of a tooth with metal. This preventive measure, in my experience, is best taken by obviating thermal stimuli by applying to the cavity one or two coatings of thin gutta-percha collodion. A solution of pure Para gutta-percha meets this condition. A thin coating of this non-conductor instantly seals the raw surface of the dentin from exposure, and assists immediately in cutting off thermal shock, thereby permitting the dentin to make an early recovery.

Hyperemia in its passive form frequently follows the placing in carious teeth of a foreign body, such as metal, to take the place of the lost enamel. The thermal irritations disappear as the fibril ends are calcified—or, negatively, if the fibril ends are destroyed. The artificial restoration of carious teeth is prosthetic and surgical. While the operation is made to restore artificially the contour of the lost parts of the organ, thereby restoring function, its stimulating influence generally serves to maintain and retain what remains of the tooth. This depends upon its protection against external environment and upon maintaining the vital energy of the dentin to create a new tissue, which is secondary dentin laid down in juxtaposition with the filling material.

SELECTION OF FILLING MATERIALS.

There are a great many ways or methods of restoring or, to use the common term, of "filling" teeth. Of these several methods, gold in its various forms is given first place by the better class of operators, for obtaining the best possible results. I question, however, if gold is the best material for general purposes. Dr. Flagg, in the days of the "amalgam war," held gold to be the poorest material for saving teeth as teeth need help in a prosthetic way. Amalgams or alloys in Flagg's day were not made so strictly scientifically as today so as to produce a perfectly balanced restorative material. Probably seventy-five per cent. of tooth restorations are now made with alloy.

Again, in respect to gold restorations, the gold foil method has largely given place to the gold inlay method. The inlay, either gold or porcelain, is an arbitrary fixed procedure that gives no protection to the dentin *per se.* The intermediate layer of cement serves to retain the inlay, and, what is of paramount consideration, to protect the tooth tissues. This procedure executed

in gold can be carried to approximately perfect conclusions, if the operator realizes the conditions and meets them with proper intelligence and skill; otherwise, even with gold, the effort terminates in failure.

I have experimented with the gold inlay and the porcelain inlay, and find the cemented link to be the weak point of the system; yet the cement acts for a time as a protector of dentin, and lessens shock to the pulp. By the use of an insoluble coating of gutta-percha and of the improved, insoluble cements, and by securing proper terminations of the enamel prisms, so that a perfectly protected joint is obtained, teeth can be restored, in my opinion, and preserved by the gold inlay method for many years. The preparatory work, however, involved in making proper alinements for the adaptation of an inlay often causes the useless destruction of much tooth material, and the necessity of working-space entails considerable suffering to the patient in separating the teeth. This latter practice, however, can be avoided by perfect technique. For reasons stated, for the last score of years I have mostly, when a metal was used, confined my operative restorative procedures upon the molars, and at times upon the bicuspids, to alloy.

Care should be used in selecting a perfectly balanced alloy. I mean by a balanced alloy one that is so constituted that the shrinkage and expansion is controlled, also one in which the color is satisfactory, and which is free from discoloring influences affecting the enamel and dentin, thereby producing discolorations of the tooth tissues. This latter influence, I believe, is largely due to the oxids and sulfids of the metals in the alloy being left in the mixture before its insertion. This discoloration emphasizes how the capillaries of tooth tissues can take up stains.

NECESSITY OF ABOLITION OF SPACE BETWEEN FILLING AND TOOTH.

Protection of the raw dentin is essential for the recuperation of tooth tissues. A perfect joint between the tooth and its prosthetic restoration is also essential to protect the tooth from its external environment. I believe this is more certainly done with a balanced alloy than with any other material.

We do not know how caries of the teeth is brought about in its initial stage, *i.e.* we are ignorant of the influences set free which constitute susceptibility and the inception of carious conditions. But we do know that a tooth once decayed is more readily destroyed by a recurrence of caries after being operated upon than it was originally. I believe one reason for this is that the enamel prisms are more readily broken away from contact with the filling if they are left short and do not reach to the dentin. Micro-organisms, which we know to be associated with caries, will probably go where saliva will go. Many of these germs have been measured. A number of them, such as the leptothrix and spirilla, which are supposed to be caries-producers, could swim through a space about a hundred-thousandth of an inch wide. This gives an idea how space must be annihilated in tooth restorations, and a protection obtained to meet conditions in the mouth.

In the gold method of restoring teeth, unless extreme care is used, the space between the restored part and the tooth wall is often filled with débris of tissue which has broken off during the operative work of restoration; this is especially the case when cohesive gold is used. In such cases, discoloration and renewal of decay soon follow. In the inlay method this need not happen, but as the cement used is porous and soluble in the fluids of the mouth, bacteria often gain an entrance into the open space around the inlay.

MANIPULATION OF AMALGAM ALLOYS.

In the use of well-prepared alloy we have a plastic which is really a cement, and can be so prepared that it is absolutely homogeneous in character, *i.e.* contains no air-cells, and can also be so prepared that it is of itself absolutely germicidal. This material permits of being packed into the cavity by rotation

with burnishers and hand instruments, which gives a perfect protection without possible injury to the cavity wall.

My usual procedure, after a cavity is prepared as far as possible in alinement with its best physical strength, is to use a balanced alloy which has received a chemical washing. No form of alloy except filings should be used; any other is indicative of the alloy being too soft. My consideration of the aging of alloy is confined to not using one too freshly made. After an alloy is made into filings, the rearrangement of its molecular composition soon is completed or satisfied, and the alloy is then ready for use. To make an alloy perfectly homogeneous, *i.e.* free from air-spaces, also to relieve it of its oxids, which have formed by exposure to the air, I have found through clinical experience that washing of the alloy in any of the hydrogen dioxid preparations or in denatured alcohol insures the best results. This is best accomplished by mixing in a mortar with a good-sized pestle that allows considerable force to be applied.

After Black's formulæ, the best alloys are composed of silver, tin, and copper; other formulæ contain gold. To my mind the addition of gold gives to the mixture a smoothness that does away with all granular conditions.

WASHING OF ALLOYS.

All alloys become oxidized on exposure to the atmosphere. When the alloy mixture includes its oxids, a mass is created which is not homogeneous, and is a possible stainer of tooth tissues. To bring about a perfectly homogeneous mixture of alloy filings and mercury, I advise a chemical washing to be made for the removal of oxids and any other foreign matter that might be present.

Large mixtures of alloy may be given one or two washings in hydrogen dioxid, followed by a washing in ninety per cent. grain alcohol; another method, which I prefer, consists in subjecting the alloy to three or four washings in denatured alcohol. This produces a tough homogeneous mass that breaks with a clean fracture, after the excess of mercury is pressed out by the fingers. The completed mixture thus prepared has a velvety texture, and being made clean, its molecular composition, being free to act, permits the homogeneous mass to be placed in absolute juxtaposition against the cavity wall. A few alloys thus treated assume a beautiful platinum color, which is permanent, and all alloys so treated are improved in their color.

CONCLUSIONS.

To sum up, this paper presents the vital aspect of conditions in tooth treatment, it being in contrast with the one I had the honor of presenting to this society four years ago at Harvey's Lake. Then my effort was to lay bare the septic influences at work in devitalized teeth, and show how positively septic influences in such conditions could be prevented by the germicidal procedure laid down in that paper. Today, in the main, I have endeavored to call attention to the vital aspect of tooth tissues as related to their prosthetic restoration.

The teeth are developed just as other organs of the body are developed, *i.e.* made up of minute cells that are independent of each other and yet correlated; and if these cells perform their functions correctly, the tissue remains normal, for all physiology and all pathology depend upon the function of cell structure.

I have had a number of patients who have reached or are past the age of fourscore years, yet whose teeth are wonderful examples of a perfect physiology, while, on the other hand, in younger people senile conditions present just as wonderfully the reverse, wherein some pathological change has robbed the cell of its vitalizing creative force, these conditions revealing themselves in the teeth.

I have every reason for believing that teeth were intended to remain with man, as well as all animals, during their natural, normal lives, their mutability being more or less coincident with all physical changes in health and in disease.

[See also *Discussion*, as reported under "Proceedings of Societies," this issue.]

THE VALUE OF PAIN IN THE DIAGNOSIS OF DISEASES INCIDENT TO THE TEETH.

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THE determination of the nature of a disease, or diagnosis, should occupy the leading place in dental science. Diagnosis is founded on symptoms, subjective and objective. The subjective symptoms gained by inquiry occupy a prominent place. The objective symptoms, consisting of signs evident of themselves and of signs elicited by special means of exploration, are the ones most frequently used by the practitioner; but the subjective symptoms of pain, although they can be simulated, and are therefore sometimes fallacious, stand preeminent before all others.

THE PHYSIOLOGY OF PAIN.

Pain is a phenomenon wisely instituted by Nature. Pain makes us realize that some external danger is threatening which we may still avoid, or that harm has already been done to the body requiring our care if we would escape more serious consequences. Pain arises as a warning signal whenever we are exposed to such conditions of life as by their continued influence would involve general disturbances to health. Pain appears before or simultaneously with the outbreak of disease, warning man that his body is in a diseased condition and requires care. Pain, the symptom of organic disease, imperatively urges the patient to save the diseased organ. Through pain, Nature imposes rest even upon the most strenuous; it dictates idleness to the most energetic, and forces the most obstinate to abide by conditions suitable for the diseased body.*

Pain may be defined as the expression of consciousness of injury to the peripheral or central nervous system by irritation or pathological condition. It is manifested through the centripetal or sensory nerves. It is present throughout the skin, and under certain conditions may be aroused by stimulation of the various visceral organs—and, indeed, in all the membranes of the body. All recent observers agree that the pain sense has a punctiform distribution in the skin, the pain points being more numerous than the pressure points. The stimulation of these points in different regions shows that the sensibility varies greatly; the cornea, for instance, is sensitive to much weaker stimuli than the finger-tips. Histological examination of the pain points indicates that there is no special end-organ, the stimulus taking effect upon the free endings of the nerves. This is especially apparent in sensitive dentin or in an exposed pulp when the explorer comes in direct contact with the nerve fibrillæ.

Pain may be caused by an irritation to the dendrites of the sensory neurons, by pressure upon the nerve trunk, by inflammation of the coverings of the nerve, or by some central disturbance. Irritation of the dendrites or the peripheral ends of the nerve is the most common. Abrasions, punctures, the action of chemicals, and thermal changes are examples of this class. The result of pressure upon a nerve trunk is clearly elucidated by reference to the neuralgic pain due to the pressure of an impacted tooth. Neuritis, or the inflammation of the perineurium, is characterized by pain localized in the course and distribution of the nerve affected, resulting, if it be a sensory nerve, in hyperesthesia of the skin, which later may become anesthetic; if it be a motor nerve, in a flaccid paral-

* See "Local Anesthesia in Dentistry." By G. Fischer and R. H. Riethmüller. Second edit. Philadelphia, 1914, p. 17.

ysis of the group of muscles supplied by the nerve. This condition is rarely found in dental practice and is associated with constitutional disturbances. Central disturbances, as cerebral hemorrhage and intracranial tumors, resulting often in a flaccid paralysis of the extremities, are prolific sources of pain if pressure is exerted upon any of the sensory paths.

DETERMINATION OF THE SEAT OF PAIN.

The great value of pain in diagnosis is that it enables one to determine the location of disease and the nature of the causal morbid process. The location of the disease is determined first of all by the seat of the pain. In pericementitis the seat of pain is readily found. In diseases of the pulp, however, the seat of pain is often obscure and must be located by more thorough exploration. In these cases the pain is often "referred." This phenomenon will be given special consideration later.

The location of the disease is also determined by the modes of expression. These are, (1) the facial expression, (2) the posture, (3) the reflex actions, and (4) the associate phenomena.

Facial expression. The facial expression is probably best known to the busy dentist. We are but too familiar with the appearance of a person suffering with severe toothache. The tensely drawn lineaments, the dilated pupils, the livid countenance, the labored respiration, the presence of swelling, together with the various anathemas which the patient hurls against teeth in general and the dentist in particular, form an *ensemble* which we observe often in our practices.

Posture. The posture often reveals immediately the nature and the cause of the disease. The clenched jaws in pulp diseases are a characteristic symptom, this attitude being due to the fact that the pain is modified by pressure. On the contrary, the jaws which remain partly open, favoring and protecting the tooth in loving sympathy, furnish the specific symptom of pericementitis. The half-open jaws in fracture and the characteristic deformity in luxation of the mandible are other examples of the importance which posture plays in diagnosis.

Reflex actions. The reflexes which are associated with local disturbances are valuable. These conditions will be described presently, but salivation, lacrimation, and muscular spasms in connection with pathological conditions of the trigeminal nerve, will bear doubled mention because of their importance.

Associated phenomena. The associated phenomena, which may be subjective or objective, play a leading part. The attitude of the patient, the position of the hands usually holding the inflamed part, the characteristic walking up and down, at least tell us that we have trouble on our hands, and set our own nervous system to thinking.

NATURE OF PAIN.

The nature of the pain is of supreme importance in making a differential diagnosis. We must know, first, the mode of onset; second, the duration, third, the character or variety; fourth, the location; fifth, the modifications produced by pressure and temperature.

Mode of onset. The mode of onset, in the majority of cases, indicates whether the morbid process involved is acute or chronic. Burchard divides disease of the dental pulp into constructive diseases, which are attended by the formation of deposits of new masses of calcific substance, and destructive diseases, which cause retrogressive and necrotic changes in the pulp. The constructive diseases are the formation of secondary dentin, tubular calcification, formation of pulp nodules, and calcareous degeneration. In all of these diseases, the mode of onset of the pain is gradual, of low grade, dull, sometimes neuralgic in character owing to the slow chronic irritation. In the destructive diseases, as arterial hyperemia, venous hyperemia, pulpitis, and the various degenerations, the mode of onset is sudden and paroxysmal—as, for instance, the lancinating pains of hyperemia. Rheu-

matic or neuralgic pains occur, it is true, in the later stages of the constructive diseases. We shall consider them later. From the mode of onset of the pain we can derive the first clue in our diagnosis as to whether the disease is acute or chronic.

Duration. The duration of the pain also indicates the acuteness or chronicity of the disease. Pain of short duration is noted in the affections in which it develops suddenly. Thus thermal changes in an exposed pulp will cause a sudden paroxysmal pain, which rapidly ceases when the external conditions are restored to normal. Pain of long duration, if constant, is usually due to organic lesions and is one of the symptoms of chronic disorders. The pain in the chronic diseases of the pulp is mentioned as an example of this class.

Character. The character of the pain suggests its location and cause. Sharp, lancinating pain is usually due to an acute inflammation. The first condition we would suspect, if a patient presented with these symptoms, would be an exposed or nearly exposed pulp. A cramping pain is indicative of a diseased joint, or is due to muscular spasm. A gnawing, boring pain generally indicates pressure, and is typified in suppuration of the pulp, acute septic apical pericementitis, impacted third molars, or the burrowing of pus under the periosteum. Throbbing pain is associated with acute inflammation and is best typified in venous hyperemia of the pulp, "where the paroxysms of pain are continuous instead of temporary—*i.e.* the pain, instead of temporarily subsiding, maintains a constant intensity for hours, does not respond promptly to sedatives, and is accompanied by a sense of fulness rather than sharp agony." (Burchard.) Dull pain is due to chronic inflammation of the bone, as in osteomyelitis and the beginning of necrosis.

Modification on pressure. Pain that is modified by pressure is usually superficial and of inflammatory origin. If the pain is increased by pressure upon the tooth or by tapping it with an instrument, we have the diagnostic sign of pericementitis. Pressure over the apex of the tooth will often give rise to local and referred pains with muscular and secretory disturbances. Pain which is somewhat relieved by pressure upon the tooth is a sign of inflammation of the pulp. Pressure on the angles of the jaw will cause pain in case of fracture at the symphysis.

Pain increased by movement points to infection of the bone, muscle, joint, or nerve involved. This is true in diseases of the temporo-mandibular joint caused by arthritis or even laxity of the ligaments. The pain in a hidden fracture of the mandible is augmented by movement, and is one of the best symptoms.

Almost all pains are modified by rest. Protecting a tooth affected with pericementitis, by fastening a fold of rubber dam to the adjoining tooth so as to open the bite, relieves the pain and assists materially in the treatment. When in doubt as to the cause of trigeminal neuralgia, resting the eyes may relieve the pain the nature of which was obscure before this respite.

Modification by heat or cold. The modification of pain by temperature gives direct information in regard to dental lesions, and is the method perhaps most frequently used by the dentist. Diagnosis of hyperemia of the pulp is made through symptoms of paroxysms of pain induced by thermal stimuli. The signs pointing to this condition are carious cavities, large metallic fillings, deep erosions and abrasions, the presence of leaking fillings, fractures of the enamel exposing the dentin, etc. The temperature of the water used in testing should not be lower than 15° C., and it should be applied drop by drop. A normal pulp will rarely respond painfully to a few drops of water flowed into a cavity at the temperature named, but a hyperemic pulp will almost invariably respond vigorously. In the absence of a carious cavity, the source of the pain is to be sought in large fillings, testing each tooth by dropping cool water on the filling. The tooth which responds with a paroxysm of intense pain, which passes

away slowly, is diagnosed as the seat of pulp hyperemia.

A condition in which the symptoms are nearly the opposite of hyperemia is abscess of the pulp. The usual symptoms are a tooth with a large filling or carious cavity, a history of discomfort or decided pain, appearing at intervals, ushered in by dull gnawing pains which are not usually positively located. The pain grows in intensity and is relieved instead of increased by applications of cold. The response to heat is so marked that a spray of hot water may precipitate an attack of severe and continued pain.

DIAGNOSIS OF REFERRED OR OBSCURE PAIN.

The diagnosis of referred or obscure pains of the head taxes the skill of the operator to the utmost. Reflexes of dental origin are both motor and sensory, the latter far outweighing the former in importance. Motor reflexes may be noted in the quick spurt of saliva from the ducts of the salivary glands upon infliction of pain in the teeth and by spasmodic contraction of the muscles about the mouth. Twitching of the muscles of the face is the common accompaniment of trigeminal neuralgia.

Dental pain arises in consequence of disorder of the sensory nerve fibers which are situated in the pulp, dentin, and pericementum. The pericementum is known as the touch organ of the tooth, and pain arising in the pericementum is readily recognized. The dentin and the pulp, however, do not have this tactile sense, hence irritation excited in them is not localized but reflected to some other part. While all reflex dental disturbances are, as a rule, located in some part of the great branch of the nerve supplying the source of irritation, the irritation may be reflected to distant parts of the same nerve and to other nerves.

To find out the cause of neuralgias or obscure pain in the head, a thorough knowledge of the sensory nerves supplying the part is of prime importance. The whole head and part of the neck are supplied with common sensation by the trigeminal and cervical plexus. The dentist ordinarily thinks of the trigeminal nerve as supplying only the teeth, when in reality it supplies the face, the greater part of the scalp, and part of the ear. Its distribution is as follows: The ophthalmic division of the trigeminal nerve is distributed to the eyeball, lacrimal gland, the mucous membrane of the nose and eyelids, the integument of the nose, the upper eyelid, the forehead, and the anterior half of the scalp. The superior maxillary division supplies the skin over the malar bone, and that of the lower eyelid, the side of the nose and the upper lip, the upper teeth, the upper part of the pharynx, the antrum of Highmore and the posterior ethmoidal cells, the soft palate, the tonsils and uvula, and the glandular structures of the roof of the mouth. The inferior maxillary division is distributed to the side of the head, the upper anterior portion of the external ear, the external auditory canal, the lower lip, and the lower part of the face; the tongue, the mouth, the lower teeth and gums, the salivary glands, and the articulation of the jaw. The great occipital nerve of the cervical plexus is distributed over the back of the head; the small occipital, to a narrow region just in front of it, and the great auricular nerve to the skin of the posterior portion of the pinna and the skin over the mastoid process.

NEURALGIA AND ITS CAUSES.

Pain simulating neuralgia is frequently due to some local irritation of one of the branches of the trigeminal nerve. Foreign bodies have been known to cause paroxysmal attacks for a number of years until removed. Reflex neuralgias from exposed dentin have been noticed. Pain referred to a different spot or area than its origin is characteristic of all pulp diseases. But, as Black has pointed out, the general rule is that the more chronic and profound degenerative changes of the pulp, such as secondary dentin and pulp stones, are much more liable to cause distant reflex pains.

Flagg records many varieties of trifacial neuralgia; pain in remote portions of the body; grave functional disorders of the eye and ear, and motor disturbances, *i.e.* chorea, epilepsy, and paralysis, having a direct demonstrable connection with hypercementosis. Neuralgia of a varying degree of severity is a common accompaniment of impacted teeth. It is most frequently noted in connection with the eruption of the lower third molar, not only because this tooth is most frequently impacted, but because of the anatomical relation of its roots to the inferior dental nerve. Functional blindness without retinal conditions to account for it has been found to arise from notably advanced degenerative changes in the dental pulp, the sight returning to the eye after loss of the diseased tooth. Dewitt records a most instructive case where temporary blindness occurred in association with septic apical pericementitis, disappearing after evacuation of the abscess, and reappearing when secondary inflammatory conditions arose in the pericementum. The ocular affection disappeared permanently and almost entirely with the loss of the tooth.

PAIN OF THE EAR OF DENTAL ORIGIN.

Hilton lays down the rule that pain in any part in the absence of a local process is due to exalted sensitiveness of the nerve of that part, and depends upon a cause remote from the painful area. Hilton further remarks that pain upon the surface of the body must be expressed by the nerve which resides there, and the cause of the pain must be situated between the peripheral termination of the nerve and its central origin. He describes a case in his "Rest and Pain" which fully illustrates that rule:

> When a patient tells us that he has earache, or pain in or upon the ear, we ought to ascertain whether it is pain upon the back of the ear or whether it is in the auditory canal; because it is obvious that the real cause must be widely different in the two cases. If the patient has pain in the auditory canal, or the upper portion of the anterior part of the external ear, the pain must be without question the result of some irritation or disease condition associated with the fifth cerebral nerve; and this gives precision to further inquiry.
>
> Now we know very well that there is often a simultaneous occurrence of earache and toothache. The same nerve which supplies the auditory canal and the anterior portion of the upper ear supplies also the teeth, hence in all probability this associated pain.
>
> A professional friend had an enlarged gland below the external ear. The cause of this was not quite apparent, so he requested me to look at it. There was a slight discharge of morbid secretion in the auditory canal. We discussed the question together, and I said, "Very likely it may be caused by your decayed tooth. Irritation from it may be conveyed to the auditory canal and induce this morbid secretion; that morbid secretion might induce slight excoriation, and that excoriation, aided by lymphatic absorption, may explain the existence of the enlarged gland." The tooth was extracted, all the other local morbid conditions disappeared, and there was no recurrence of the symptoms.

NECESSITY OF A THOROUGH DIAGNOSIS.

In these simple words the author has given us the key for the diagnosis of all pains of the head caused by a local irritant. When we consider that 85 per cent. of the neuralgias of the head are of dental origin, we must not underestimate the importance of a thorough diagnosis. We should not be content with data obtained with the explorer, but delve deeper into the nature, the duration, and the mode of onset of the pain itself. This will give us an inkling of the cause of the morbid process involved, whether it be acute or chronic. Knowing this we will be on the lookout for conditions leading to these symptoms. Instead of saying to our patients, "Oh, you have just caught cold," or, "Perhaps if you wouldn't think about it, it would pass away," or, "It is just a touch of neuralgia,"—or, what is worse still, administering nerve sedatives which may produce fatal consequences—let us adopt rational therapeutics and search for the "real cause."

External pain, or pain upon the surface of the body, if not properly appreciated, may be considered as an external sign of some

distant derangement. If the pain persists—if it does not depend on any transient cause—it becomes necessary to seek the precise position of the pain; and as soon as we recognize the precise position of the pain, we are enabled, by knowledge of the distribution of the nerve or nerves of that part, to arrive at the only rational suggestion as to what nerve is the exponent of the symptom. By following centripetally the course of the nerve, and bearing in mind its relation to surrounding parts, we shall in all probability be able to reach the original, the producing cause of the pain, and consequently to adopt the correct diagnosis. (Hilton, "Rest and Pain.")

FURTHER STUDIES ON NOVOCAIN-SUPRARENIN ANESTHESIA.

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(Read before the Northeastern Dental Association, at its annual meeting, Boston, Mass., October 15, 1914.)

(I.)

THE adoption of local anesthesia by novocain-suprarenin, which for about a decade has been the method of predilection in dental practice on the European continent, in Great Britain, and South America, has been specially dilatory and cautious in the United States. The chief reasons for this seeming conservatism are probably three:

First: The injudicious employment of cocain and proprietary secret cocain preparations by unethical "painless dentists," which have inspired the public and the ethical practitioner alike with a fear of the utilization of that treacherous alkaloid.

Second: Frequent failures in local anesthesia due to a lack of appreciation of the physiological and anatomic premises upon which all methods of this specialty are based, and of the imperative necessity of asepsis—of solution, instrumentarium, and field of operation.

Third: A partiality to general anesthesia, apparently justified by the remarkable development of nitrous oxid and oxygen anesthesia and analgesia in this country.

A more discriminating appreciation of the relative merits of nitrous oxid and oxygen general anesthesia and novocain-suprarenin local anesthesia, however, is close at hand, since local anesthesia has, within recent years, found enthusiastic advocates, among both the American dental and medical professions, foremost of whom stands Crile, whose anoci-association has done so much toward assigning to local anesthesia its duly merited place. Among noted American surgeons, local anesthesia by novocain-suprarenin has found stanch supporters in the Mayo brothers, R. Matas, Schley, McArthur, J. F. Mitchell, Emil Harris, and others.

REASONS FOR THE INCREASING POPULARITY OF LOCAL ANESTHESIA.

The increasing popularity of local anesthesia over general anesthesia is due, besides its incomparably greater safety, absolute certainty of insensibility, and facility of operating, to three factors:

(1) The admixture of suprarenal preparations to the anesthetic solution, as suggested by Prof. Heinrich Braun of Zwickau, the "father" and pioneer of local anesthesia, by which absorption of the anesthetic into the circulation is retarded, the depth of anesthesia is in-

creased, and anemia in the field of operation is insured.

(2) The substitution of cocain by far less toxic, more stable and uniformly effective, sterilizable, and non-habit-forming synthetic products—among which novocain, or the hydrochlorid of para-amino-benzoyl-diethyl-amino-ethanol is given preference universally.

(3) The perfection of the method of perineural and conductive anesthesia—which again we owe to Braun.

In Braun's text-book on "Local Anesthesia: Its Scientific Basis and Practical Use," * designed for general surgery, and in that of Prof. Dr. Guido Fischer on "Local Anesthesia in Dentistry," † addressed to the dental practitioner, and in an abundance of essays, chiefly from German sources, which are enumerated in the third German edition of Fischer's text-book, and in Bünte and Moral's monograph,‡ the chemistry, pharmacology, and toxicology of novocain and synthetic suprarenin, alone and in combination, have been thoroughly discussed. The results and arguments of these investigations are fairly familiar to the reader of American dental journals, in which numerous general articles have appeared on this topic, under the acknowledged—and more frequently under the mute, but manifest—sponsorship of the pioneers mentioned.

NOVOCAIN SOLUTIONS AND ADMIXTURES SUGGESTED.

Although it has been established by animal experimentation that novocain is seven times less toxic than cocain, and although clinical experience in man has shown this toxicity to be ten times less than that of cocain, attempts have been made to reduce this toxicity even further by the admixture of certain drugs.

PEPTONE ADMIXTURES.

I have given due consideration to the suggestion of Fichot and Billard, who, on the basis of interesting studies regarding anaphylaxis, have suggested the employment of mixtures of peptone and novocain, as noted in my paper on "Local Anesthesia in Dentistry, with Special Consideration of Novocain."* Practical reasons strongly militate against this mixture, since no guarantee is offered as to whether the peptone and novocain solutions are sterile without their having been boiled immediately before injection—to do which is, of course, impossible, as the peptone coagulates on boiling. Moreover, the formation of a wheal and the retardation of absorption of the solution are undesirable.

ADMIXTURE OF HYDROGEN DIOXID.

The association of hydrogen dioxid with novocain, as indicated by Marmouget and indorsed by Mahé and Vanel† involves the great disadvantage of lack of isotonia. Moreover, we have learned by sad experiences to be extremely cautious in the use of hydrogen dioxid, which may produce grave tissue lesions, especially when injected hypodermically.

ADMIXTURE OF SODIUM BICARBONATE.

Gros and Laewen‡ have experimented with novocain - sodium - bicarbonate - so-

* "Local Anesthesia: Its Scientific Basis and Practical Use." By Prof. Dr. Heinrich Braun. Translated and edited by Percy Shields, M.D., A.C.S., Cincinnati, O. Lea & Febiger, Philadelphia and New York, 1914.

† "Local Anesthesia in Dentistry, with Special Reference to the Mucous and Conductive Methods." By Prof. Dr. Guido Fischer. Second American from the third German edition, thoroughly revised with additions by Richard H. Riethmüller, Ph.D., D.D.S. Lea & Febiger, Philadelphia and New York, 1914.

‡ Bünte and Moral, "Die Leitungsanästhesie im Ober- und Unterkiefer, auf Grund der anatomischen Verhältnisse." Berlin, 1910.

* "Local Anesthesia in Dentistry, with Special Consideration of Novocain." By Richard H. Riethmüller, Ph.D., D.D.S., DENTAL COSMOS, February 1913, p. 169.

† *Presse Médicale*, Paris, April 23, 1913; see review in DENTAL COSMOS, January 1914, p. 124.

‡ Gros, "Ueber eine Methode, die anästhetisirende Wirkung der Lokalanästhetika zu

dium-chlorid-adrenalin solutions, claiming for them more rapid and enduring anesthesia, especially in extradural anesthesia and in operations on the lower limbs. Since this method has not found general consideration, and has not been satisfactorily tested out in dental operations, we can limit ourselves to a mere mention thereof. Moreover, these investigators affirm that they could not dispense with the solutions indicated by Braun.

ADMIXTURE OF POTASSIUM SULFATE.

A more promising line of research was taken up by Hoffmann and Kochmann,* and, for dental practice, by Philipp,† who found that by the addition of potassium sulfate the concentration of novocain can be reduced to one-half, that of suprarenin to one-fourth of the usual dose. Philipp employs for dental operations the following formula: Novocain 1, L. synthetic suprarenin Hoechst 0.00125, potassium sulfate 0.4, to be added to 100 cc. of an 0.9 per cent. sodium chlorid solution; and he claims for it more rapid, profound, and enduring anesthesia, the possibility of employment of larger doses, innocuity even in cardiacs, the aged, debilitated, and the very young, and almost normal postoperative hemorrhage. We await confirmation of these claims by practical experimentation, and the publication of further clinical data.

ISOTONIA OF SOLUTION.

So far, the solution of novocain-suprarenin in modified Ringer solution, as thoroughly tested by Professor Guerber at the instance of Prof. Guido Fischer, and elaborately discussed in all its phases in the latter's text-book (*loc. cit.*, p. 62), has proved most advantageous in every respect. A repetition here of the modified Ringer formula may not be amiss:

Sodium chlorid,	0.5
Calcium chlorid,	0.04
Potassium chlorid,	0.02
Aqua destillata,	100.00

The very convenient tablet form in which this mixture is being marketed, one tablet to be added to 10 cc. of aqua destillata, is of great practical advantage.

A great deal of discussion has arisen as to the optimum isotonia of normal (physiological) salt solution in combination with from ½ to 2 per cent. novocain. Seidel especially has expended a great deal of ingenuity and energy in an effort to arrive at definite conclusions. Yet the discussion of this point at a meeting of specialists in local anesthesia, held at Muenster i. W. on November 15 and 16, 1912, resulted in the adoption of the compromise resolutions Nos. XIV and XV, stating that "The question as to what percentage of sodium chlorid should be added to a two or a one per cent. novocain-suprarenin solution in order to make an absolutely isotonic solution is not accurately solved as yet. The data adduced by Bünte, Moral, and Fischer do not seem to be sufficient to guarantee a scientific solution of this question. Practical experience shows no difference whatever in the behavior of 1½ or 2 per cent. novocain solutions in from 0.6 to 0.9 per cent. sodium chlorid solutions. The amount of sodium chlorid which would fulfil also the theoretical requirements is not yet known."

It is rather surprising that in all these discussions regarding the isotonia of the anesthetic solution, the variances in the chemical composition and the sodium chlorid contents of the blood of various individuals, or of the same individual at different times, viz, as affected by age, illness, pregnancy, etc., have been left out of consideration. It is manifestly

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steigern," *Münch. Med. Wochenschrift*, 1910. No. 39.

Laewen, "Ueber die Verwendung des Novokain in Natrium-Bikarbonat-Kochsalzlösungen zur lokalen Anästhesie," *Münch. Med. Wochenschrift*, 1910, No. 39.

* See *Deutsche Zahnärzl. Wochenschrift*, 1914, p. 514.

† See *Deutsche Zahnärzl. Wochenschrift*, 1914, p. 297.

impossible to determine accurately the sodium chlorid factor in the blood of every individual without a previous careful analysis. A low percentage of sodium chlorid, viz, 0.6 per cent., seems preferable, as this percentage is raised slightly by the admixture of the calcium and potassium chlorids in the Ringer solution, and of the novocain, and by the evaporation of water during the routine boiling of the solution before and after the addition of the novocain-suprarenin.

PREPARATION OF THE ANESTHETIC SOLUTION.

Great care should be exercised in the acidulation by hydrochloric acid of the normal salt or Ringer solutions, as recommended by Braun. If a receptacle of non-alkaline Jena glass is used, this acidulation is unnecessary. If one of ordinary glass is employed, the operator should make sure that only a minute quantity (one drop) of a very weak (10 per cent.) pure hydrochloric acid solution is used, since any undue excess of the acid will produce considerable after-pain, and possibly tissue lesions.

The method of making a fresh solution from novocain-suprarenin tablets in front of the patient has a great deal to recommend it. By watching, the patient's mind is occupied, the operator has an opportunity to impress the patient with the asepsis of his working method, and the best possible guarantee is assured to both patient and operator as to the injected solution being really sterile.

The employment of the dry novocain-suprarenin tablets for preparing the solution has proved to be most practical in dental practice. Seidel's method of adding the suprarenin in liquid form from a standard pipet admits too many possible sources of error, and will never aid in rendering local anesthesia the common property of dentists. Suprarenin will keep longest in dry form, and the discoloration of the solution is a reliable guide as to its quality. No risk should be taken with a solution made from tablets which are not white. Tablets should be kept in rubber-stoppered tubes preferably. Sometimes a slight discoloration of the topmost tablet in a freshly broached tube is noted; such tablets are to be discarded promptly, and special attention should be paid to the color of the solution of the other tablets in such a tube; they will usually be found absolutely fresh and white.

In fairness to method and operator alike, the manufacturers of novocain-suprarenin tablets should be willing to print the date of manufacture or packing of their tablets upon the tubes, and to use air-proof and bacteria-proof stoppers to insure the freshness and sterility of the tablets. Preservation of the tubes in a dry and cool place will then insure a maximum stability of the tablets, which in my experience have kept fresh in unbroached tubes for two years. After a tube is once opened, its contents should be used up within a reasonably short time, since the repeated admission of air and moisture soon seems to inaugurate chemical changes.

The addition of sodium chlorid to novocain-suprarenin tablets for the purpose of simplifying the preparation of isotonic solutions, as practiced by some drug houses, should be discouraged, since they give discolored solutions within a very short time after purchase, and especially after a tube has been broached, proving that the combination of novocain-suprarenin and sodium chlorid is very unstable, chiefly owing to the hygroscopic property of sodium chlorid.

AMPULES.

The slight disadvantage which may accrue from the hygroscopic nature of novocain-suprarenin tablets is overcome by the use of sterile novocain-suprarenin solution in ampules of neutral yellow Jena glass. For the practitioner who employs local anesthesia only occasionally, this form seems the most practical. The objections to ampules which I have raised before,* saying that "Their contents are not always sterile, small open-

* DENTAL COSMOS, February 1913, p. 176.

ings being left in sealing the glass necks," have been overcome, since reliable manufacturers are now carefully testing in a vacuum each ampule as to its being hermetically and firmly sealed. In general medical practice, millions of ampules are used every year with apparently perfect safety, and this form of dispensing solutions is increasing in popularity with the growing use of intravenous medication. Moreover, the discoloration of stale novocain-suprarenin solutions is a reliable danger signal. In a busy practice, of course, the routine use of ampules will prove rather expensive.

DANGER FROM STALE SOLUTIONS.

The practitioner cannot be too urgently warned to refrain from the use of stale novocain-suprarenin solutions, which may produce very serious results, such as analgesia persisting for weeks, extensive edema, dangerous hemorrhage, and necrosis.* Considering the ease with which absolutely safe solutions can be prepared, such sequelæ are inexcusable.

ADMIXTURE OF SUPRARENIN.

In accord with several other investigators, Seidel† has pointed out that the toxicity of our anesthetic solutions is due less to the novocain than to the suprarenin. Suprarenin is probably the strongest poison known, being active even in a dilution of 1 : 100,000, yet we cannot and would not dispense with it in local anesthesia, as it not only localizes and intensifies the action of novocain, hence allows of the concentration of the anesthetic and the injection of larger doses, and produces a temporary anemia so essential for neat surgical work without continual flooding of the field of operation, but, according to the findings of Kochmann and Esch,* it prepares the nerve tissue for the reception of the local anesthetic in about the same manner as a mordant is applied in the dyeing industry for rendering cloth more receptive of the dyestuff. Since fractions of one milligram of suprarenin suffice to produce anemia in a comparatively large operative field, the percentage can be reduced without essentially impairing the anesthetic action of the solution, in arterio-sclerotics, cardiacs, suspected aneurysm, in children and the aged, also in those operations in which anemia of the field is not essentially necessary, as in simple extractions, pulp extirpations, excavation of hypersensitive dentin, scaling operations, etc. In all these cases I have obtained excellent results from tablets E and G—the E tablet containing 0.02 gram novocain and 0.00005 gram suprarenin, the G tablet 0.015 gram novocain and 0.00005 gram suprarenin—by adding from $\frac{1}{3}$ to $\frac{1}{2}$ more Ringer solution, thus reducing the concentration of both novocain and suprarenin without notably reducing the anesthetic power of the solution.

A tablet of the concentration of 0.02 gram novocain and 0.00002 gram suprarenin was first suggested at the Muenster meeting held in November 1912, and Thoma of Boston attributes special advantages to this tablet, which he has christened the T tablet. These advantages, in my opinion, are rather illusory, since the modified tablet E solution does not produce an anemia sufficiently pronounced to interrupt the circulation of the blood completely, and in surgical operations such as specially difficult extractions, apical resections, curettages, etc., it is customary to freshen up the wound by suitable manipulation or the use of a sharp spoon so as to produce a free flow of blood before suturing the wound. According to Braun, who surely

* See "Necrosis Due to Stale Novocain Solution," DENTAL COSMOS, December 1913, p. 1295.

Von Gaza, *Deutsche Med. Wochenschrift*, 1913, No. 16.

† *Deutsche Zahnheilk. in Vorträgen*, vol. 28.

* Kochmann, M., "Wirkung des Adrenalins bei der Kombination mit Lokalanästheticis," *Deutsche Zahnärztl. Wochenschrift*, 1911, No. 4.

Esch, P., "Ueber das wirksame Prinzip der Nebennierenpräparate in Verbindung mit den Lokalanästheticis," *M. Kl.*, 1911, No. 30.

speaks with authority, the dosage of suprarenin as employed in the tablets designed for dental purposes will not produce any untoward effects. Hospital internes are employing considerably larger doses in collapse due to infectious diseases, viz, as much as 6 mg. per day, even 24 mg. per day (Kirchheim). The doses employed in local anesthesia may therefore be considered innocuous as long as pure and fresh preparations are employed. Euler and Scheff have proved by experiment that the vitality of a dental pulp is not endangered by the now generally adopted dosage of our injecting solutions, and the latter's statement has been verified by innumerable experiences, viz. that the E and G novocain solutions do not in the least disturb either the vitality of the teeth anesthetized or that of the approximating teeth, "provided the perfect vitality of the pulp before injection has been established."

For the sake of systematization, individualization in selected cases, and simplicity of technique, it is highly desirable to adhere to the solutions which have proved so eminently satisfactory in innumerable cases; else we run the risk of confusing and deterring the beginner in local anesthesia, and running short of letters in the Latin and Greek alphabets, if each practitioner suggests a tablet of his own modification.

The systemic innocuity of our dental solutions has only recently been attested anew by Dr. A. Therre's painstaking investigations in lactating women,* who exhibit no subjective symptoms whatever, no changes quantitatively or qualitatively in the milk or urine, or in the behavior and frequency of urination in the child, and no chemical trace of novocain or adrenalin in the mother's milk or urine.

THE MÜNSTER RESOLUTIONS.

For the sake of completeness, it may be well to quote here the sixteen resolutions adopted by the Münster meeting, as they represent an important landmark in the controversy concerning the dosage of novocain-suprarenin solutions:

(1) The fresher a novocain-suprarenin solution, the less its toxicity and the greater its anesthetic effect. For this reason, all scientific investigations regarding the effect of these preparations should be conducted exclusively with absolutely fresh solutions prepared and sterilized by the operator himself. A clear idea of the effect of novocain-suprarenin solution can be obtained only if the operator is certain of having used only novocain and suprarenin, not their products of decomposition. Test solutions must not contain any admixtures excepting the amount of sodium chlorid necessary for isotonia, else the possible sequelæ from such admixtures might be confused with those from the novocain and the suprarenin. These factors must not be lost sight of in the judgment of the earlier literature on this subject.

(2) Fresh novocain solutions, as well as fresh suprarenin solutions and fresh mixtures of novocain and suprarenin solutions, must be as clear as water and colorless.

(3) In practice, any novocain solution is to be regarded as being "fresh" and fully effective as long as it remains clear and colorless.

(4) The same applies to suprarenin solution. Solutions of suprarenin are the less stable the more diluted they are.

(5) Novocain and suprarenin solutions in mixture can be considered fresh only directly after mixing the two preparations in solution. Within ten minutes under certain conditions, such as excessively high temperature, influence of light, admission of air, etc., discoloration of the novocain-suprarenin solution, with diminution in anesthetic power and increase in toxicity, may occur.

(6) A sterile novocain-suprarenin solution cannot be rendered more stable by antiseptic admixtures, as the yellow discoloration of the novocain and the red discoloration of the suprarenin is based upon chemic processes, viz, oxidation, not upon bacterial ones.

For this reason a novocain-suprarenin solution must be sterile, but need not be of antiseptic character.

(7) Antiseptic admixtures, as for instance thymol, are not only superfluous, but deleterious. At present no antiseptic is known to exist which in a concentration of sufficient antiseptic power to permit of easier manipulation of the solution, is absolutely non-irritating when injected.

* L'Anesthésie Dentaire par la Novocaine-Adrénaline chez les Femmes qui allaitent. *La Province Dentaire,* June 15, 1914, p. 211.

(8) Individualization in the concentration of the novocain is not necessary in the small doses employed in dental operations. Contrary to cocain, it is immaterial whether a certain dose of novocain is injected in weak or strong concentration, as long as the entire dose does not exceed 0.2 gram.

(9) Since in dental operations the part to be anesthetized, viz, the bone of the maxillæ and the teeth, cannot be infiltrated directly, but the diffusion of the anesthetic must be relied upon, only solutions of comparatively high concentration are applicable.

(10) The optimum concentration of novocain for dental purposes is the 2 per cent. solution.

(11) On the other hand, the concentration of suprarenin calls for individualization in many cases in dental practice. This is necessary, because—

a. The toxicity of the suprarenin largely depends upon the concentration of the dose employed, especially in aged individuals and arterio-sclerotics, and in case of accidental injection into a bloodvessel.

b. The more nearly normal the hemorrhage from a wound in the oral cavity, the better the course of healing and the less the probability of after-pain. Since in many cases, such as root-resection without skilled assistance, fractures, etc., a pronounced anemia of the field of operation is desirable, while in other cases, such as easy extractions, normal hemorrhage should be interfered with as little as possible for the sake of rapid wound-healing, therefore all these circumstances call for individualization in the dosage of suprarenin.

(12) In normal cases, the best results are obtained by the addition of 0.00002 gram suprarenin to each cc. of 2 per cent. novocain solution.

(13) In cardiacs and in the aged this dosage should be reduced to 0.00001 gram; if pronounced anemia in the field of operation is desired, increased to 0.00005 gram.

(14) and (15) [See under "Isotonia of Solution," p. 1322.]

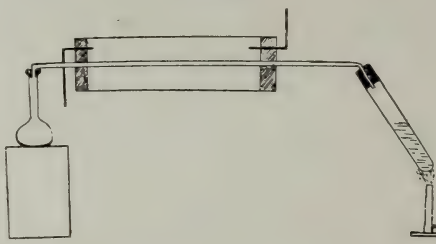
(16) The above requirements for dental practice are not entirely fulfilled by the percentages contained in either novocain-suprarenin tablets or ampules. The operator, therefore, should prepare and graduate his own solutions in the manner described by Seidel or by some other suitable method.

A further commentary on these resolutions is superfluous, since every phase contained therein is critically discussed in the respective subdivisions of this paper.

THE IMPORTANCE OF DISTILLED WATER.

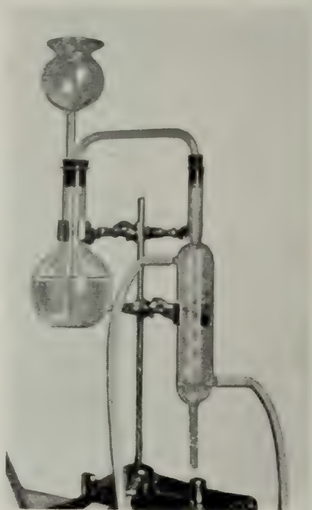
Too much attention cannot be paid to the use of really distilled water in preparing the Ringer solution. The shortcomings of the aqua destillata as purchased in pharmacies have been emphasized by me before,* and have since been corroborated by analysis of further samples bought at random. As a home-made filter, the one suggested by W.

Fig. 1.



Merres' home-made apparatus for distilling water.

Fig. 2.



Silverman's apparatus for distilling water.

* Dental Cosmos, February 1913, p. 175.

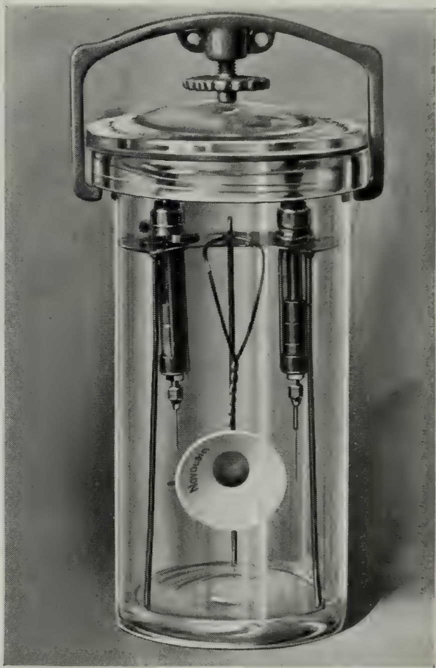
Merres* will suffice for small quantities. (See Fig. 1.) A far more elegant apparatus has been constructed by Dr. S. L. Silverman of Atlanta, Ga., which has a capacity of eight ounces (see Fig. 2); but a Femel, Boltze, or other distilling apparatus will prove a decidedly good investment to the practitioner who does not care to construct one of these appliances himself.

MODIFICATIONS IN THE INSTRUMENTARIUM SUGGESTED.

This brings us to the question of instrumentarium, in regard to which I have offered the following suggestions to the section on Anesthesia, of the Sixth International Dental Congress, London.

Fischer has shown that every instrumentarium should be designed with a view to avoiding any break in the delicate chain of asepsis. With this aim in view, I have suggested a slight modification of his instrument jar. An anatomic specimen jar (see Fig. 3) is fitted with a platform-stand of porcelain, glass, or enamel ware, accommodating two Fischer syringes fully mounted, one with a short, the other with a long needle, and corresponding hubs, a graduated dissolving cup of porcelain, a pair of aluminum tweezers —that metal not being attacked by the action of iodin—and two reserve needles and hubs. In this jar the sterilized instruments are suspended in a mixture of 70 per cent. alcohol one-half gallon, and chemically pure glycerin about one fluidounce. The glycerin is added merely for the purpose of imparting to the alcohol a slightly lubricating quality. Alcohol in the strength of from 60 to 70 per cent. has the greatest germicidal power according to the findings of Leedham-Greene† and Beyer.‡ Post and Nicoll claim germicidal power for solutions as weak as 30 per cent., while, on the other hand, Koch's and Sternberg's experiments have shown that chemically pure alcohol and 95 per cent. alcohol is without germicidal effect. The mixture indicated by Fischer, of two parts absolute alcohol and one part glycerin, makes the instruments very disagreeable to the touch, and slippery, if the glycerin has

FIG. 3.



Writer's anatomic specimen jar for preserving syringes, dissolving-cup, pliers, and lancet.

not been completely washed off; it also requires a more lengthy and tedious washing in boiling sterilized water to remove all traces of the preserving solution, which, if injected hypodermically with the novocain-suprarenin solution, would produce most undesirably prolonged anesthesia.

The boiling water drawn up into the syringe to rinse out the alcohol and glycerin should never be squirted back into the sterilizer, since by doing so the

* *Deutsche Zahnärztl. Wochenschrift,* June 13, 1914, p. 464.

† "The Local Preparation of Patients for Operation." By A. D. Whiting, *Journ. Amer. Med. Association,* August 8, 1914.

‡ See *Münch. Med. Wochenschrift,* 1912, p. 1408.

water in the sterilizer is mixed with traces of glycerin, and the interior of the syringe barrel really is not freed entirely from this undesirable admixture.

Clamping of the cross-bar to the rubber ring fitting to the edge of the jar prevents all ingress of air, dust, and bacteria, also the sticking of the lid so often encountered if ground-glass

FIG. 4.

Writer's jar for preserving syringes, needles in hubs, and lancet.

covers are used, as well as evaporation of the alcohol.

I have also suggested another jar, in which the ground cover can be easily prized loose even in case of sticking, and which is more elegant than the anatomic specimen jar. (See Fig. 4.)

A platform of glass, porcelain, or enamel ware is being suggested for the reason that aluminum, or nickeled metal, soon oxidizes, especially if the stand is not fully immersed in the alcohol. If a metal stand is used, the alcohol should be poured away, the stand cleaned, and a new alcohol solution made as soon as the old one appears cloudy. In order to prolong the usefulness of the solution, which gradually loses its optimum concentration owing to its hygroscopic nature, it is practical, when the syringe is put away after use, to rinse it thoroughly inside and out in boiling distilled water, and then to evaporate the adhering water in dry heat, as for instance by laying the syringe on a sterile napkin on top of the closed sterilizer. Care is to be exercised not to overheat the syringe, and to allow it to cool somewhat before drawing into it any alcohol solution from the jar, and suspending it in the mixture, lest the glass barrel crack.

The electric sterilizer or boiler, which is best fed with distilled water, should be so constructed that the heating elements do not come into direct contact with the water. Sterilizers so constructed that the heating element dips into the water are unsuitable, as they are unclean at best. The use of gasburners is not advisable, as the combustion is not perfect unless compressed air is admixed, and undesirable particles of soot are carried into the solution or deposited upon the iridio-platinum needle in sterilizing by glowing it out in the flame.

It is perhaps no unnecessary repetition to point out again that all alkalis, such as the soda admixture customary in sterilizing instruments, must be religiously avoided, since even minute traces of alkalis have an untoward effect upon novocain-suprarenin solutions, as they precipitate the novocain in the form of the base, which is insoluble in water, the tablet consisting of the hydrochlorid of novocain.

The use of saturated borax solution for preserving the syringes I have found unsatisfactory, as the metal parts are quickly oxidized, and borax in substance is deposited thereon. Even in the alcohol solution, oxidation of the metal parts of the syringe will take place after a while, so that occasional cleansing and sterilizing of the syringe is indispensable. The more deeply the syringes dip into

the alcohol mixture, the greater the guarantee that they will be sterile when removed therefrom, and that no contamination of the solution with bacteria collected on the outside of the syringe can take place.

I am at present conducting a series of experiments with white liquid vaselin as a medium in which to preserve syringes, hypodermic needles, etc., in sterile condition. From evidence gained so far, this or similar media will offer considerable advantages over alcohol. A more definite verdict, however, must be reserved for a future paper, as a great many bacteriological and other tests will have to be made before any decision can be reached as to the advisability of the adoption of these petroleum products for the purpose indicated.

Fig. 5.

Writer's stock flask for Ringer solution.

STOCK FLASK FOR RINGER SOLUTION.

For preparing, preserving, and dispensing the Ringer solution under as nearly bacteria-proof conditions as possible, I have designed the receptacles illustrated in Figs. 5 and 6. The flask in Fig. 5 has a small pinhole opening in the side of the neck, as does the ground-glass cover. If a quantity of solution is desired, the cover is turned to make the two holes coincide and admit a minimum of air, which additionally can be filtered by fastening a pledget of sterile cotton over the hole in the neck

Fig. 6.

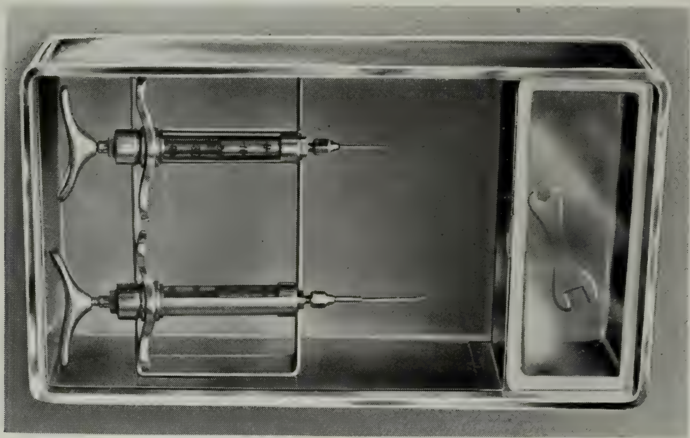
Writer's improved stock flask for Ringer solution.

by means of a rubber band, dental floss, etc. To emit the liquid it is further necessary to turn the glass cock so as to bring the perforation therein in line with the aperture in the nozzle. Immediately after the desired amount of liquid has been poured out, the glass cock is given a turn of 90 degrees, and the cover is turned slightly in the neck of the bottle, thus excluding all air while the solution is not needed. When the flask is not in use, the aperture of the nozzle must be protected against dust by inserting a wisp of sterile cotton. This drawback is overcome in the flask illustrated in Fig. 6, also of my design, made of non-alkaline glass. Its construction is based on the principles just described. Instead of a glass cock, a

glass hood is fitted over the nozzle so as to exclude all air when the flask is not in use. I have found Ringer solution to remain sterile in this container, which is made in 50 or 100 cc. sizes, for over a month. It is advisable, of course, to make a small and fresh quantity of Ringer solution from the Ringer tablets every week. Like the tubes containing the novocain-suprarenin tablets, those with the Ringer tablets must be carefully stoppered immediately after the required number of tablets have been rolled out, since they are highly hygroscopic. None of these tablets should ever be touched with the hand; they can easily be rolled out of the original tube into the liquid in which they are to be dissolved, and a probable source of contamination is thus easily avoided.

To prevent possible breaking of the stock flask when preparing and sterilizing the Ringer solution, a sterile napkin or a wad of sterile cotton is wound around the flask, and the flask is set into the water of the sterilizer before the current has been turned on. The glass stoppers also are sterilized by boiling, the large opening in the flask having been stoppered with a wad of sterile cotton. Sterilization of the Ringer solution is imperative, though fresh tablets and aqua destillata have been used, and sterilization can be considered complete after the flask has stood in this improvised water-bath for about twenty minutes. The ground-glass stoppers are put in place upon completion of sterilization with a pair of sterile pliers, and the flask is allowed to cool. Fractional sterilization of the Ringer solution is ideal, but impractical. Moreover, the boiling of the solution before adding novocain-suprarenin tablets insures perfect sterility.

FIG. 7.



Writer's working tray of glass.

GLASS WORKING TRAY.

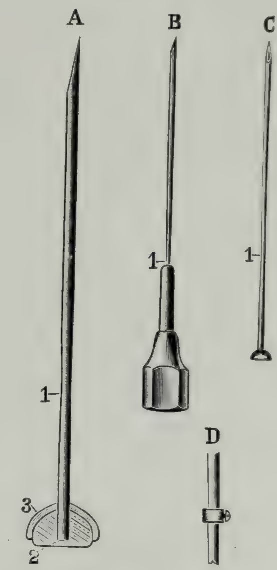
A working tray of glass with aluminum inset (see Fig. 7), on which the syringes with either long or short needles and hubs can be safely deposited while not in use, has proved to be a valuable accessory, as it prevents accidental contamination of the needle or syringe, blunting of the needle, and injury to the operator. The measurements of this tray are such as to accommodate the syringes when filled. The tray is additionally fitted with a smaller tray with ground-glass cover for keeping needles, hubs, wrench, broaches, and probes in an

antiseptic solution. Below the inset there is sufficient space for depositing a Pravaz syringe outfit, ampules containing camphorated oil for hypodermic use, amyl nitrite, and a small bottle of camphorated validol, all of which prove invaluable if close at hand when needed. I have never had to use any but the camphorated validol, of which I administer five drops in a little water to children, ten drops to adults, as soon as the slightest trace of facial pallor appears, which usually is due to nothing more than fear, or, in difficult extractions, to mental and physical strain. A tube of bromural tablets, for internal administration to fretful children and nervous adults, 30 minutes before injection, one of trigemin capsules to be given with proper instructions to patients in whom, owing to the severity of the operation and the resulting surgical traumatism, post-operative pain is to be expected, and one of novocain powder to dress wounds with so as to insure speedier and painless healing, are also always kept close at hand.

NEEDLES.

The possibility of breaking a needle during the act of injecting still deters some operators from adopting local anesthesia in their practices. This danger has been largely done away with by the use of iridio-platinum or tantalum in their manufacture. Steel needles do not permit of sterilization by drawing through an alcohol flame; hence, unless such a needle has been thoroughly boiled immediately before injecting, we are never sure as to its sterility. Owing to the danger of rusting, steel needles should be discarded immediately after use. The inexperienced operator especially should not attempt to acquire facility in injection with the use of these needles, fragments of which are difficult to remove, especially if the needle has broken in conductive work. If, in simple infiltration anesthesias, where, owing to the resistance of the periosteum a needle is more liable to break, especially if excessive pressure is employed, the operator fixes his palpating finger-tip over the needle point, as a routine manipulation, compression with this finger-tip will prevent disappearance of the needle fragment into the soft tissue; after more or less complete anesthesia

Fig. 8.



Suggested improved hypodermic needles of iridio-platinum.

A, Enlarged reproduction of needle. 1, Point of taper. 2, Soft metal core for tightening the needle on the orifice of the syringe. 3, Conical outer shell of hard metal.
B, Long needle with taper at 1 in long hub C.
C, Long needle with taper at 1 for conductive work; length 42 mm., diameter 0.47 mm.
D, Safety device with set-screw, applied just above the taper of the needle.

has been established, depending upon how much solution has been injected before the accident occurred, the fragment is located by a transverse (never a vertical) incision with a sharp, sterile lancet, and picked out with sterile pliers. Iridio-platinum needles have given the best service; they are sterilized in the alcohol flame before the solution is drawn into the syringe, and before putting the syringe away in the alcohol jar. If the point has become dull, it can easily

be freshened with a fine stone in the dental engine. Excessive sharpness of the point is as undesirable as dulness; the former because bloodvessels might be pierced instead of being gently pushed aside, the latter because the undue pain from the insertion of the needle might frighten the patient, and lacerations of the more deeply lying tissues might be produced.

The experiments with trocar needles, as suggested by Fischer (*loc. cit.*) are not yet final. If a trocar needle is employed, it is necessary to wait until the cannula has filled entirely with blood, otherwise there is danger of causing an air embolus. In conductive anesthesia in the mouth, where we usually injure no bloodvessels, hence cause little or no hemorrhage, it may require some time till the cannula fills. At any rate, the straight needle technique has proved so simple and satisfactory that it may be wise to consider this as the standard method until a really remarkable improvement has been suggested, which is hardly likely to occur.

An important step toward greater safety, however, could be made, if the manufacturers of hypodermic needles would construct their needles on the principle of the Gates-Glidden or Beutelrock drill, viz, with a slight taper toward a shoulder which would come to lie just outside the mouth of the hub (see Fig. 8), so that, if a break should occur, it would be likely at this weakest point, leaving a portion of the needle protruding from the mucous membrane, and making it possible by swift manipulation to withdraw the fragment with a pair of sterile pliers without any incision. The best safeguard against breaking a needle is, of course, delicate manual dexterity, and the avoidance of all undue force or pressure.

To allay the novice's fear of breaking a needle, I have thought of the safety device illustrated in Fig. 8, D. This consists of a delicate iridio-platinum ring with set-screw which is fastened on the needle just above the taper. Owing to its smallness, it will not interfere with the manipulation of the needle, which should be of slightly greater length to allow for the slight loss in reach occasioned by the safety device. If the needle should now break, which is most likely to occur at its weakest point, viz, the taper, it cannot escape into the tissues, the diameter of the safety device being larger than that of the needle puncture, and the needle can be easily picked out before it has any opportunity to migrate.

PROPOSED MODIFICATION IN THE FISCHER SYRINGE.

Since Bolten* has shown by very painstaking tests that the metal parts with which the novocain solution comes in contact within the Fischer syringe act as electrodes, the solution itself as an electrolyte, producing fairly rapid decomposition of the solution, as evinced by its discoloration if left in the syringe barrel for more than about ten minutes, it seems advisable to cover these metal parts with an insulating layer of cemented glass, or better still, some form of insoluble enamel which would not materially complicate the manufacture of these beautiful instruments.

* See *Correspondenz-Blatt für Zahnärzte*, April 1914, p. 97; also review in DENTAL COSMOS, September 1914, p. 1093.

(To be continued.)

TUBE TEETH AND PORCELAIN RODS: THEIR USES AND ADAPTATIONS IN PROSTHETIC DENTISTRY.

By JOHN GIRDWOOD, D.D.S.Univ.Pa., L.D.S.Edin., Edinburgh, Scotland.

(Continued from page 1228.)

(VIII.)

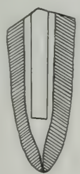
CHAPTER X.—Bridge Work.

(Continued.)

ANCHORAGE BY SPLIT POST.

This form of anchorage has not hitherto been as popular as its excellence as a form of attachment warrants, but the reason for this is not far to seek, and has arisen from the unsuitability of the ordinary form of gold bridge. The method usually adopted has been that suggested by Dr. Peeso, which consists of a metal tube soldered to the capped end of the root, into which it is permanently fixed, while the split post which enters the tube is permanently fixed to the bridge. The objections to this form of anchorage are based mainly on the extensive enlargement of the canal for accommodating the tube, whereby the root is unduly weakened (Fig. 133). In consequence, the use of this form of attachment is confined almost exclusively to the canines. By the use of the all-porcelain bridge, the component parts of the attachment are reversed, the tube being formed through the body of the porcelain, while the split post is attached to the cap in the same manner as with a tube crown, and is continuous with and forms the post for anchorage into the root-canal. Some of the advantages derived from reversal of the parts played by post and tube are: Simplicity of construction, conservation of tooth substance due to lack of necessity of undue enlargement of the root-canal, increase of strength of attachment, and easiness of repair. With regard to simplicity of construction, the making of a separate tube and post to accurately fit is done away with, and there is no necessity for enlarging the canal more than for a post for a single crown. Any size of post may be used, as that part which enters

Fig. 133.



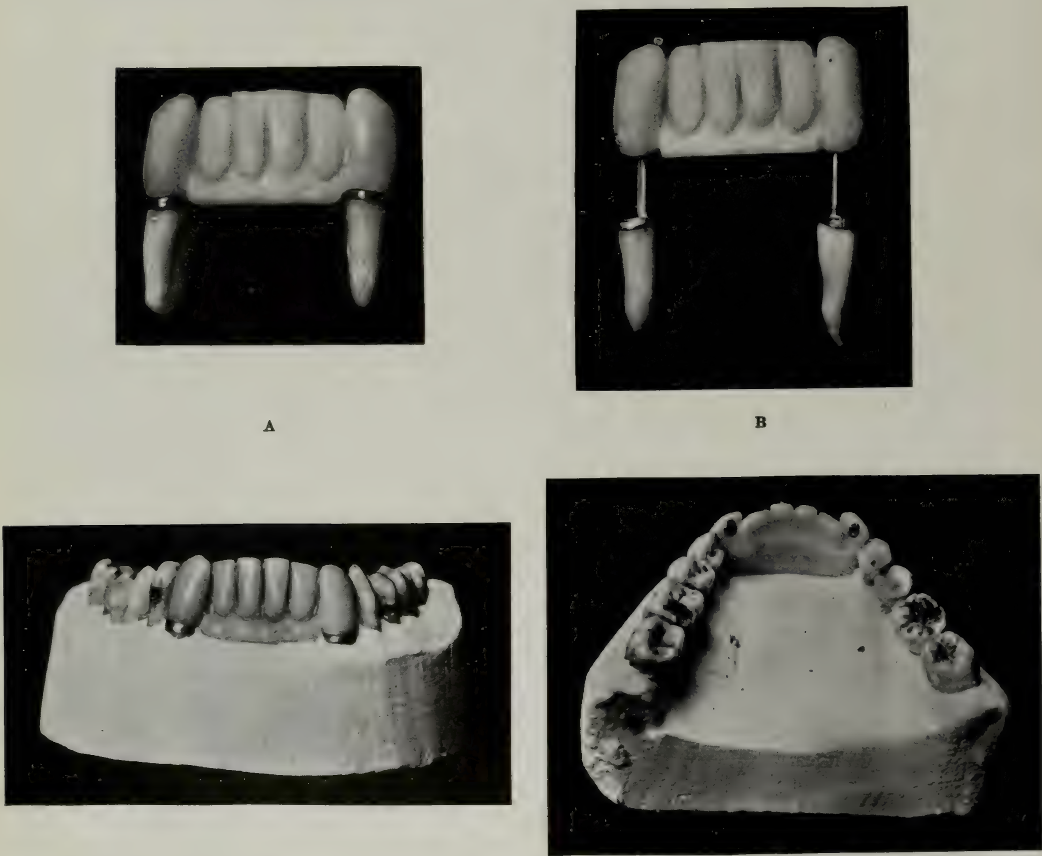
Shows root unduly weakened.

Fig. 134.

Shows split post with piece of metal through it to show length of split.

the canal can be reduced, while the split post projecting from the cap may be left as stout as desired (Fig. 134), and as the strength of a split post is less than that of a solid post of equal diameter, the advantage of employing a stouter post than is possible under the older method will be apparent. With regard to easiness of repair, it will be obvious that by the method suggested replacement of a broken post would only involve removal of the cap and post from the root, and soldering a new split post to the cap. Provision would ordinarily be provided for easy removal of the cap by anticipating such a possibility, and fixing the caps with gutta-percha or with gutta-percha and cement, while by the older method, the application of a new post is not only more difficult, but involves the risks incident to re-soldering, with its attendant danger of cracked facings.

Fig. 135.



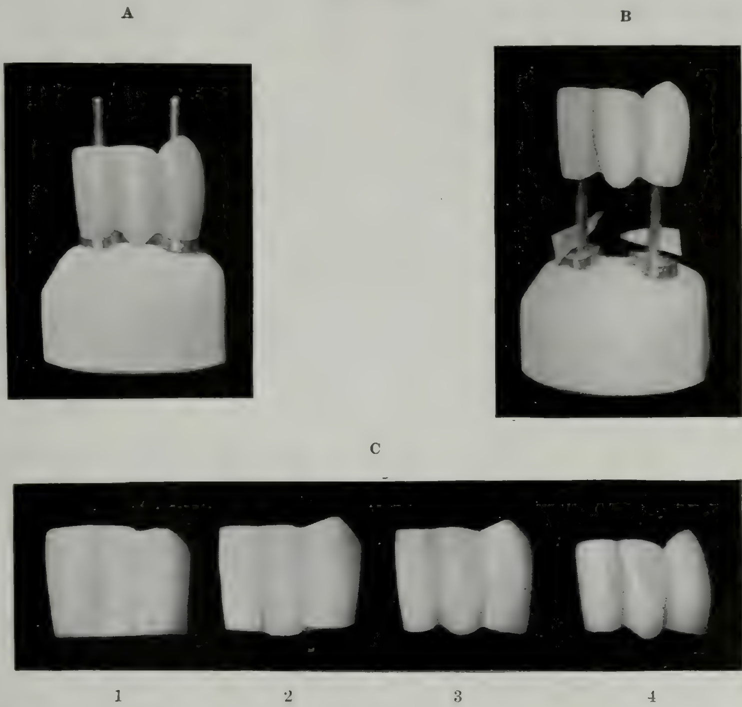
A B C D

A, B, Lower removable saddle bridge of six front teeth anchored by means of split posts. C, Bridge in position, labial view. D, Lingual view.

Yet another and very important advantage is that the anchorage of a bridge may be made wholly dependent upon two or more split posts, as in Fig. 135, which shows a saddle bridge of six lower

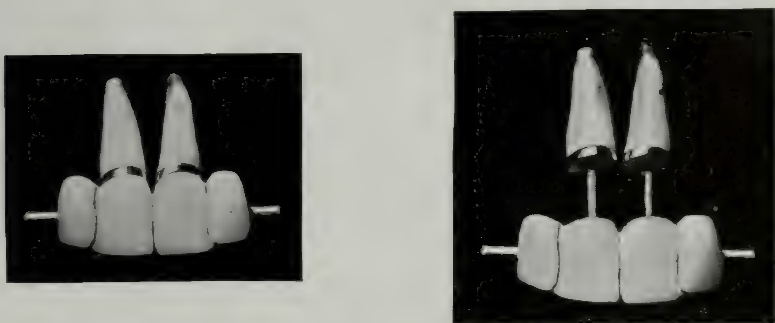
front teeth, which has been shaped-up from tube rod No. 26; also small lower bridge (Fig. 136) consisting of the central incisor, lateral, and lower left canine, from rod No. 32, with tubes in the vertical direction. Another specimen is shown in Fig. 137, which illustrates an upper bridge of four teeth, shaped-up

Fig. 136.



A, Lower removable bridge of three teeth in which vertical split posts are employed for anchorage. B, Shows bridge partially removed to show split pins. C, Shaping up three-tooth bridge—1, Rough shaping up, 6 min. 2, Fitting to caps and shaping up, 35 min. 3, Shaping nearly completed, 50 min. 4, Bridge completed, say 80 min.

Fig. 137.



Upper removable bridge of four incisors with split post anchorage. Total time for shaping up, smoothing, and polishing, 90 min.

from rod No. 25. Here the anchorage is by caps and split posts on the centrals, thus constituting a removable bridge; or solid posts may be employed, making it a fixed bridge, while, if desired, additional anchorage or support may be obtained by utilizing the horizontal tube. When a split post is used in such a manner that it is not continuous with the post entering the root, as it generally must be in the case of a molar, then it is well to employ a stouter cap than usual, as a greater strain is imposed upon the post when the bridge is not cemented to the anchorages. In consequence, a greater lateral strain is also imposed upon the caps. These latter,

Fig. 138.

Post projecting through cap in order to obtain additional strength.

in consequence, should be made extra stout, size 26 or 28. If additional strength is desired, the split post may be allowed to project through the cap (Fig. 138) into the pulp chamber, and further strength gained by also uniting it to the post entering the canal.

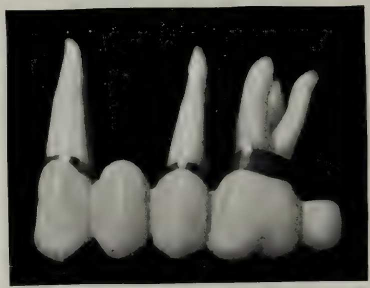
BRIDGE WITH PORCELAIN EXTENSION.

Fig. 139 shows a bridge for the upper left side, consisting of the canine, bicuspids, and first molar, to which an extension is formed for the purpose of utilizing the whole of the articulating surface of a lower tooth. Here the anchorage is seen to consist of caps and posts, as already described, and the posts may either be solid or split posts. Where the latter are used the bridge can be made removable.

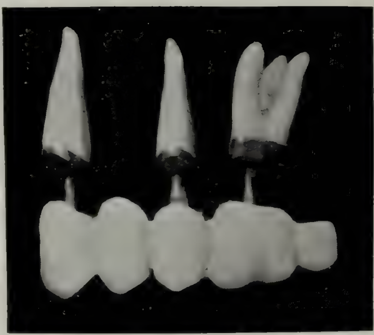
ANCHORAGE BY PORCELAIN SHELL CROWNS.

This may be done by applying the principle and adopting the plan shown

Fig. 139.



A



B

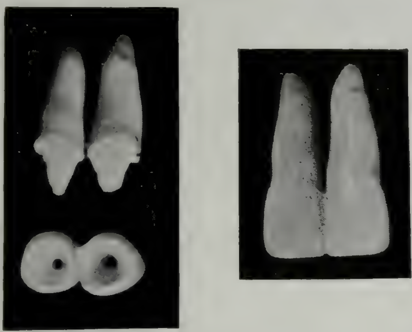
C

Four-tooth bridge with porcelain extension.

in Fig. 114, in Chapter IX, whereby a tube crown or section of tube rod may have its base hollowed out to afford

anchorage without the necessity of interfering with the existing mode of attachment. Fig. 140 shows two central incisors so shaped from rod No. 30, with tubes $5\frac{1}{2}$ millimeters apart. The foregoing method may be applied for the

FIG. 140.

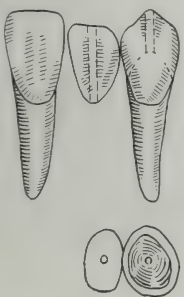


A B

Shows shell crowns.

replacement of a pair of detached- or fixed-post crowns, the renewal of which from some or any cause may necessitate this, and where it is undesirable to attempt removal of the existing anchorages. Thus, for instance, it may be

FIG. 141.

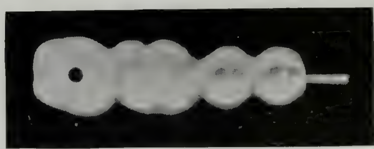


Canine porcelain shell crown with lateral incisor extension.

employed for the replacement of two Richmond crowns, by grinding off the metal backings and leaving the posts standing sufficiently high to afford the necessary anchorage, or for joining together two loose roots. A further extension of the principle is shown in Fig. 141, where it will be seen that one root is missing.

Proceeding, then, with the subject of anchorage, Fig. 142 shows an upper bridge suitable for a case in which both the bicuspids and first molar are missing, and the second molar so badly broken down that it requires crowning. The canine is here utilized for the anterior anchorage, the pulp being devitalized for the purpose, and a post fitted to the canal, on to which an inlay is formed to fill the cavity. To this a post is extended horizontally backward the full length of the porcelain bridge. The posterior anchorage is obtained by soldering a vertical post in the center of the molar cap, its exact position and direction being got by first drilling a tube through the porcelain in the manner before

FIG. 142.



Upper bridge of four teeth shaped up from single-tube rod.

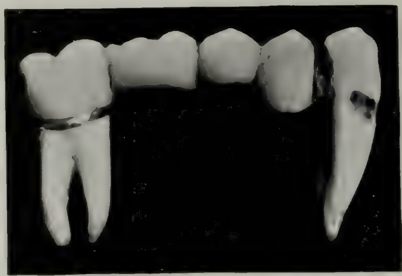
shown. Of course, a double-tubed rod could be used with a view to obtaining greater strength. This may be done as in Fig. 143, which shows a bridge for the lower right side consisting of two molars and two bicuspids, in which anchorage is obtained by means of an unbanded cap with post on to the second molar, and a large inlay and post into the canine. Here it will be observed that provision has been made for a large self-cleansing space by cutting away the cervical portion of the second bicuspid and first molar.

Another way to meet a case of this kind is shown in Fig. 122, wherein it will be seen that a double-tubed rod is employed, the horizontal bars of which may be made to extend into a large filling in the third molar, the anterior end

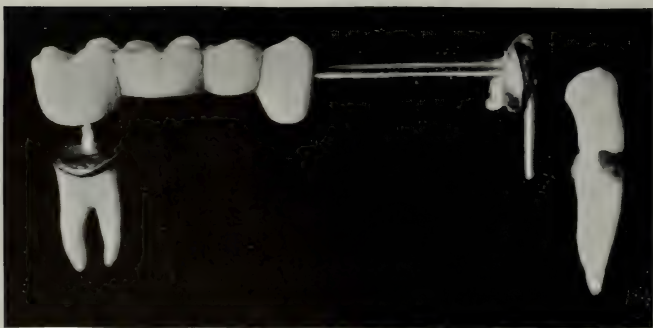
of the anchorage being formed by joining the bars together, and anchoring them by means of an inlay into the canine; or inlays may be formed at each end.

it will be seen that a horizontal bar is attached to each of the inlays, and that the inlays may be further extended into recesses cut into the ends of the porcelain bridge.

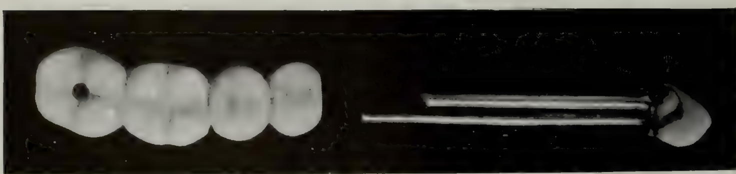
Fig. 143.



A



B



C

A, Right lower bridge with large self-cleansing space. B, C, Showing method of construction.

Fig. 144 shows an upper front tooth bridge consisting of the four incisors shaped-up from a rod in which the tubes are 2½ millimeters apart. A simple form of anchorage suitable for a case of this kind is shown in Fig. 145, where

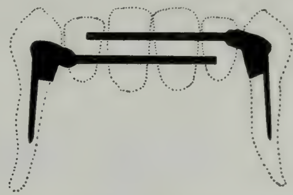
While such an arrangement of sunk inlays in the porcelain is not necessary, it has the advantage of providing for a greater amount of freedom with regard to the relation of the post in the canals to the horizontal ones carrying the

bridge, and such an amount of latitude is often an advantage, and in the case of a single-tubed rod it is doubtless more often advantageous, as it minimizes the amount of strain put upon the horizontal bar.

Fig. 144.

Upper front tooth bridge.

Fig. 145.

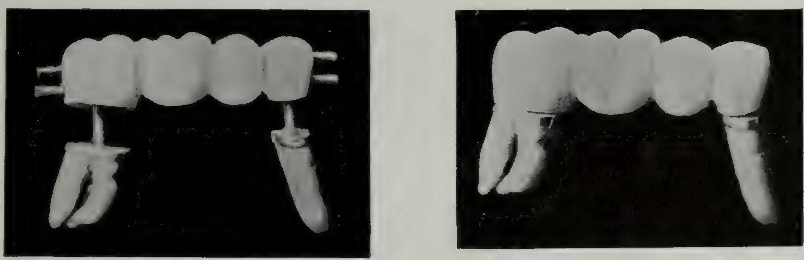


Anchorage suitable for front tooth bridge.

METHODS OF DEALING WITH CONVERGING OR DIVERGING TEETH OR ROOTS.

It is not necessary to have the surfaces of individual roots made exactly parallel to each other, a so-called necessity strongly insisted upon by most writers. It is true, of course, that parallelism is advantageous, and indeed necessary in most cases where each end of a bridge is formed by a shell crown, but where a bridge is formed from a porcelain rod or where tube teeth are employed, it is not necessary if a method similar to that shown in Fig. 146 is employed. The foregoing illustration shows a lower molar tilted forward, and a bicuspid also tilted, so that they converge. In dealing with such a case, the molar and bicuspid roots may be shaped up without regard being paid to their direction, and they may be capped and banded in the usual manner. The post attached to the bicuspid cap may be bent so that the part which projects above it, and which is to carry the anterior end of the bridge, is made parallel with the long axis of the crown of the adjoining teeth. An impression and bite should then be taken of the caps in position on the roots. The impression will doubtless come away, leaving the caps, and these should be replaced in the impression before it is cast. The molar cap should then have a separate post soldered to it, and parallel to the post attached to the bicuspid cap. A suitable porcelain rod having been chosen, a hole should be drilled through it corresponding with the bicuspid post. The shaping-up of the porcelain rod should then

Fig. 146.



A B

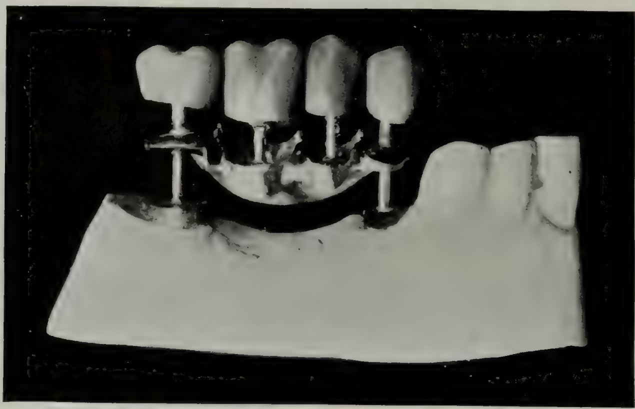
A, Bridge partly removed to show parallelism of posts. B, Bridge in position.

be proceeded with, the post acting as a guide. After it has been rough-fitted and shaped up, a second hole parallel to the first should be drilled for the molar post. This may be made to intersect the existing horizontal tube, or just to one side of it, in the case of a single-tubed rod. In the case of a double-tubed rod, it may be drilled in like manner, or between the tubes when they are horizontal, after which the shaping up, fitting, and polishing may be completed, when the piece is ready for setting.

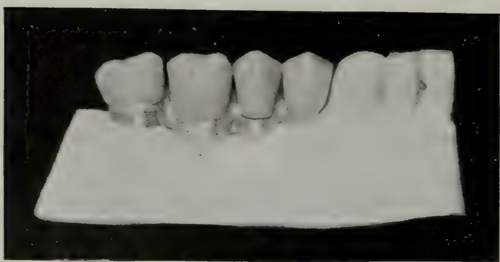
In this manner, then, the difficulty associated with converging roots is easily and satisfactorily overcome. The horizontal post or bar need not be dispensed with, either, but can be cemented into the tube before the piece is permanently fixed on its anchorage.

Fig. 147 shows a case of an upper left bridge with a cast metal base, where single tube teeth have been employed, and while it serves the purpose of exhibiting the use of these teeth, it also illustrates another method of dealing with divergent roots.

Fig. 147.



A



B

Upper left bridge with cast base, showing application of single-tube teeth. A, Bridge partially raised, to show details of construction. B, Bridge in position.

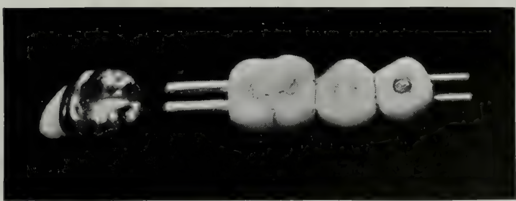
FLEXIBLE ANCHORAGE.

This is another method of dealing with diverging and converging roots. Such a case as that shown in Fig. 148 would ordinarily necessitate the sacrifice of a

greater amount of tooth substance than appears desirable, and as an all-gold crown may be the most suitable form of anchorage for the posterior end of a bridge, the following method of anchorage will be found to meet the requirements of a large number of cases. Fig. 148 illustrates the case of a lower right bridge of four teeth, the second molar constituting the posterior anchorage, being formed by an all-gold or shell crown in the usual way, but strengthened or reinforced on its anterior approximal surface in order to better support the anchorage bars. Holes are drilled through the reinforced surface of the crown to permit the bars to pass through sufficiently far to enable their ends to be held fast by the cementing medium attaching the crown to the roots, sufficient flexibility being thereby obtained to overcome excessive divergence of the abutments. The end of the bars may be roughened in order to secure a better hold for the cement. They may also be extended to the far side of the molar crown, or through it to the next tooth. The bar or bars may be flattened or roughened at the end to assist retention, but in the writer's experience this strain antero-posteriorly is nearly always slight, and so he cannot indorse the statement of some writers who take an opposite view. The illustrations also show the anterior anchorage to the first bicuspid to be formed by means of a cap and post, a vertical tube being drilled through the bicuspid for the purpose. The horizontal posts are also shown projecting, and if need be could be utilized for additional anchorage into the canine.

Fig. 148.

A



B

A, Right lower bridge of four teeth with flexible anchorage. B, Shows method of construction.

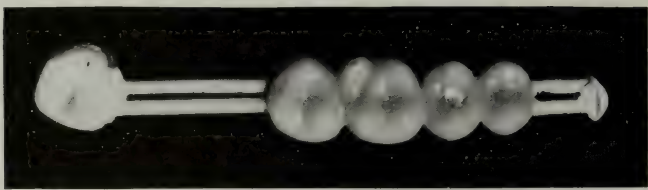
ANCHORAGE BY MEANS OF AN ALL-GOLD CROWN.

Fig. 149 shows a bridge of five teeth for the upper left side, and here the posterior anchorage is formed by an all-gold crown, to which the countersunk inlay which joins the bars is soldered. The anterior anchorages consist of the usual cap and post for second bicuspid,

through which a tube has been drilled for the post. The other anchorage is provided for by a countersunk inlay on the end of the bars, which may be joined to an inlay or inlay and a post, or to a crown on the canine. With regard to the bars, the posterior ones extend to the middle of the second bicuspid, while the anterior ones meet them at that point. In this manner the maximum amount of strength is obtained, as for all practical purposes the bars are continuous.* Various modifications of the foregoing will naturally suggest themselves.

Fig. 149.

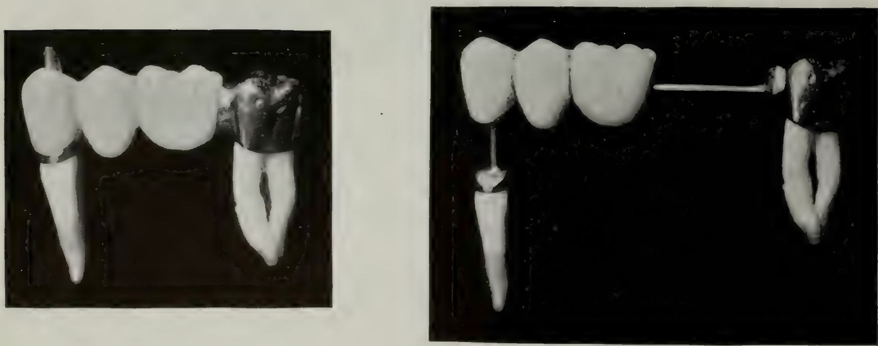
A



B

Left upper bridge made from double-tube rod.

Fig. 150.



A B

Lower bridge formed from single-tube rod No. 25.

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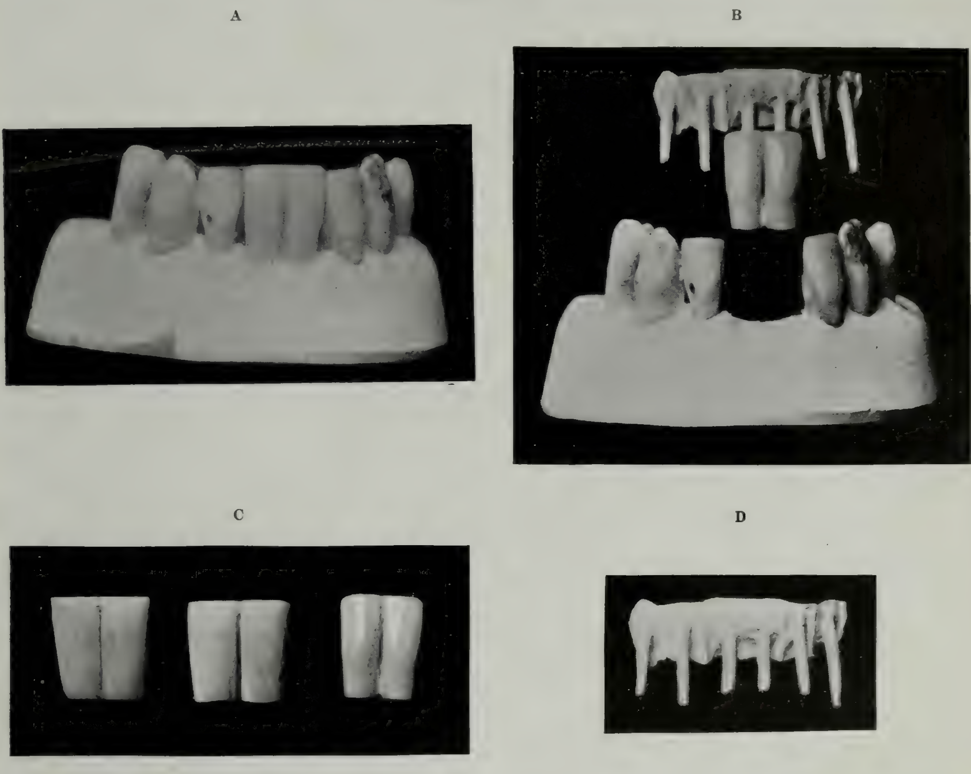
* Fig. 150 shows another example; that of a lower bridge for the left side shaped-up from single-tube rod No. 25, and with bar and

SPLINT CARRYING TUBE TEETH OR PORCELAIN BRIDGE.

A type of case frequently met with is shown in Fig. 151 where one or more of the lower incisors has been lost owing to recession of the gum or some other cause, and is generally associated with looseness of the adjoining teeth. The treatment of such cases when carried out by means of a splint carrying a soldered tooth or teeth to fill the space, and at the same time support the remaining teeth, is open to several objections, the principal of which is the danger of fracture of the porcelain facing. By the employment of two tube teeth shaped-up from a porcelain rod in the manner shown in Fig. 151, it will be seen that this danger can be avoided, the splint being carried across the lingual surface of the remaining teeth, which are shaped in order to allow of sufficient gold for the bar which is anchored into their lingual surfaces. It will be seen that the pins which carry the teeth are soldered to the under side of the splint, and that the porcelain has been ground away sufficiently to allow of ample strength

Fig. 151.



A, Model with bridge and splint in position. B, Splint raised, showing details of construction. C, Shows stages in the shaping up of porcelain bridge. 1, Cutting off and rough shaping; time, 6 min. 2, Further shaping up, 9 min. 3, Completing shaping up, smoothing and polishing, 30 min. Total time, 45 min. D, Shows gold splint.

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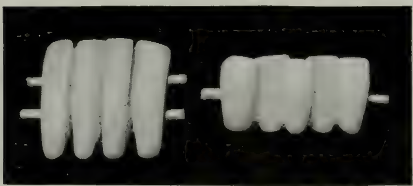
countersunk inlay to prevent rotation and soldered to all-gold crown, the anterior anchorage being formed by means of the usual cap and post on the first bicusipd.

of gold without unduly weakening the teeth, while a little extra has been ground off the approximal surfaces of the adjoining teeth without involving their labial surfaces; thus giving the maximum strength of metal at the part where it is most required. Such cases may also be dealt with by means of porcelain rods used horizontally, and Fig. 152 shows bridges suitable for use in this way.

It is needless, however, to go on multiplying suggested methods of attachment, as it is obvious that the means provided by horizontal as well as vertical tubes permit of an almost unlimited variety of anchorages, in which teeth with living pulps, or devitalized ones, as well as the various forms of all-gold, porcelain-faced, and other forms of crowns may be utilized. The attachment of the horizontal rods to the porcelain may be effected by means of sulfur or cement or both. That is to say, one of the attachments may be by means of sulfur, while the other is made with cement, and the anchorage into the canals of cavities may be either by means of gutta-percha or cement, or both; but the subject will be more fully dealt with on another occasion.

Fig. 152.



Two lower bridges shaped up from tube rods.

The foregoing description and illustrations have had reference to what may be called suspension bridges, that is, bridges which have not depended to an appreciable extent upon the gum for their support, but upon the abutments. Saddle bridges, which are to a considerable extent dependent upon support from the soft tissues, may be shaped-up to fit the alveolar border accurately, and without the necessity for a swaged or cast metal base. Where the bite is a fairly open one, gum tube sections may be used, but this subject will be dealt with in Chapter XIII, dealing with "Gum Tube Sections—A Suggested Revival."

THE REPAIR OF PORCELAIN BRIDGE WORK.

This may appear a more formidable matter than the repair of an ordinary bridge, but it is not so. Indeed, unless the bridge is one involving three or more teeth, it should not occupy more time, and in many cases will take less. Accidents, too, are less common than with ordinary bridges, and this will be apparent when one considers how weak is the attachment of teeth with platinum pins, compared with tubes, and the strain to which they are sometimes unavoidably subjected, in spite of all endeavors to protect them with gold backings and crowns. In addition, there is the risk to which they are subjected in soldering.

Fracture sometimes means replacement of the whole of the porcelain part of the bridge, but as the size of the tube rod used will generally have been noted, no time need be spent in selecting one.

The foregoing description of the method of forming all-porcelain bridges, while lacking in some details, will, it is hoped, prove sufficiently clear to form a basis from which the average man may be able to prosecute a line of work which will prove satisfactory to himself as well as to his patient. But the whole subject will be more fully dealt with later on.

(To be continued.)

CLINICAL REPORT UPON AMŒBIC PYORRHEA.

By M. T. BARRETT, D.D.S., Philadelphia, Pa.,
ASSISTANT INSTRUCTOR IN NORMAL HISTOLOGY, DENTAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

AT the last meeting of the Pennsylvania Dental Society, July 1, 1914, the writer presented a paper upon the oral endamœbæ in relation to pyorrhea alveolaris (see DENTAL COSMOS, August 1914), as a preliminary report of studies conducted by Dr. Allen J. Smith and himself upon this subject in the pathological laboratory of the School of Medicine of the University of Pennsylvania. A further paper, dealing with the discovery of these parasites in the tonsils in cases of chronic hypertrophic tonsillitis, and with their probable relationship to various systemic complications such as arthritis, obscure anemias, and gastro-intestinal diseases was presented before the Philadelphia Pathological Society in the early part of October 1914, by Smith, Middleton, and the writer, and now awaits publication in the *Journal of the American Medical Association.*

In the same connection and in response to a wide interest manifested by the dental profession toward this subject, the writer desires here to review his clinical experience in the determination of the affection and in its treatment by emetin as proposed in the preliminary report above referred to.

PRESENCE OF ENDAMŒBÆ IN THE MAJORITY OF PYORRHEA CASES.

It should be stated here that none of those who have been engaged in this study have held or now believe that all cases of pyorrhea are due primarily or alone to the presence of the oral endamœbæ. As a matter of fact, in a large number of cases which have thus far come under observation, the parasites have been found present in the contents of the pyorrhea pockets almost uniformly; yet there have been a few cases in which they have not been discovered, and in any case it would be illogical to deny associated importance to the myriads of other organisms which are also found in the lesion. However, the fact of the presence of these protozoa in so large a proportion of the pyorrhea pockets, and the disappearance of the suppuration under appropriate treatment by a known amœbicide such as emetin, have served to justify the claim that they are the immediately important factors in an overwhelming number of pyorrhea cases, and that this group of cases may with propriety be denominated as amœbic pyorrhea, in contradistinction to the much smaller class of cases in which they are not found and which are due probably to other causes. The conclusions of Bass and Johns of New Orleans (*New Orleans Med. and Surg. Journal,* vol. lxvii, No. 5, p. 456, November 1914), based upon the discovery of endamœbæ in 85 out of 87 cases of Riggs' disease examined by them, and their declaration that emetin hydrochlorid administered hypodermically by them is virtually a specific in the affection, is in entire harmony with these views.

MICROSCOPIC EXAMINATION.

It is felt, therefore, that preliminary to the use of emetin in any given case of pyorrhea, a microscopic examination of the contents of the pockets be made for the determination of the presence or absence of these parasites, and at the present stage of our experience it is advised that beneficial results from the

employment of emetin be expected only in those cases in which the endamœbæ are discernible. Such examination is not only a guide to and justification for the use of emetin, but unquestionably is likely in this or that instance to lead to the discovery of other features of importance. So, too, microscopic examination should be repeated once or twice during the period of active treatment and after the cessation of suppuration, for the accumulation of data which in the end must be the best evidence of the general efficiency of the method of treatment. Briefly stated, the procedure of examination is as follows: A small portion of the purulent contents of one of the pockets is taken up on a suitable instrument such as a flat stiff scaler not more than from one-tenth to one-eighth of an inch in width, and this is diffused in a drop of slightly warmed normal saline solution deposited on a warm slide. This preparation is covered with an ordinary thin cover-glass, and the fresh and unstained material examined at once, without further preparation, using a 4 mm. objective. If so desired, one may use, in order to bring out to some degree the nucleus in the living parasite, a small amount of very dilute neutral red solution diffused under the cover-glass. Permanent preparations are best made by spreading the contents of the pocket upon a cover-glass and fixing, while moist, in a saturated solution of mercury bichlorid in alcohol, and afterward washing out the mercury with iodin and alcohol and staining by the Giemsa method. For diagnostic purposes, however, examination of unprepared material for the moving organism is quite sufficient, and in some ways advantageous, particularly in the matter of economy in time. Caution as to the maintenance of the warmth of the preparation should be insisted upon—a matter which is not of much difficulty in the warmer months but may require the use of a warm stage in the winter of such a climate as that of this city. When seen in its living state the organism is a gelatinous-looking cell, ranging up to about 30 micromillimeters in diameter, moving in characteristic amœbiform manner, and thrusting out, here and there about its periphery, one or two thick lobose to digitate pseudopodia, with a distinct but scant ectosarc (best seen in the pseudopods and about their bases), and with a granular and more or less vacuolated endosarc. The nucleus is practically always invisible in the unstained specimen; in stained preparations it is small in size and contains but little chromatin, in grains or scant threads. The nuclear membrane is thin and poorly defined, and the karyosome small. In the cytoplasm there are, at least in the larger examples, and as a rule seen best after staining, numerous coarse ingested bodies, remnants of leucocytic nuclei, of red blood cells, and often a large number of bacteria. Undigested red blood cells are occasionally seen in the living amœbic body; but these, if watched only for a few minutes, rapidly disappear owing to the effectiveness of the amœbic intracellular digestive agencies.

It is perhaps well to suggest that, in withdrawing the contents of the pockets for examination, violent scraping of the wall of the pocket be avoided, so as to prevent the admixture of any great proportion of blood, which, of course, adds to the confusion already sufficiently great because of the pus and myriads of vegetable organisms.

ADJUVANT TREATMENT.

It is a matter of but little consequence to the question under immediate consideration how deeply the pockets extend—in other words, whether, in exact anatomical classification, we are dealing in a given case with a superficial gingival pyorrhea or a deeper alveolar pyorrhea. In either case, if the amœbæ be found present in the contained material, the writer believes the use of emetin as a specific amœbicidal remedy to be justified and indicated. Other measures, as the fixation of loose teeth, the removal of tartar at some stage of the treatment, the employment (if found necessary after the destruction of the endamœbæ) of special antibacterial agents, may of

course be of value in particular instances; but the writer does not hesitate to advise that in all cases of peridental suppuration in which endamœbæ are found, emetin should be used, either alone or in combination with other selected measures.

MODE OF APPLICATION OF EMETIN HYDROCHLORID.

The remedy, in the opinion of the writer, for pyorrhea alone is best administered by local application to foci of suppuration about the teeth. Where there is a wider distribution of the parasites, as in the tonsils or elsewhere, and where systemic complications exist, the hypodermic administration of the remedy is to be advised. Pyorrhea may likewise be dealt with by hypodermatic or intramuscular administration of emetin, a procedure especially commended by Bass and Johns (*sup. cit.*). A ½ per cent. solution of emetin hydrochlorid (alkaloid) is effective and preferable in local treatments, higher concentrations being likely to provoke inflammatory reactions in the gum. Care should be exercised to use a neutral solution of the salt, as free hydrochloric acid is apt to be an irritant to the gums and adjacent surfaces. The simple litmus test is sufficient to determine this point, and all new solutions should be tested, and if necessary neutralized by the addition of a suitable amount of sodium carbonate. The solution is introduced in the pyorrhea pockets with an ordinary hypodermic syringe with a straight or curved needle as needed, so as to gain access to all parts of the pockets. The point of the needle should pass along the root of the tooth to the bottom of the pocket, merely engaging with the wall, and be carried about to all of its parts. In one sense, of course, it would be well to actually penetrate the wall of the pocket, and thus in the discharge of the solution insure diffusion of the emetin in the surrounding tissues. However, this is not essential, and the mechanical harm done to the wall by the instrumental puncture, and that occasioned by carrying infective material through the wall by the penetrating point, are sufficient reasons for trying to avoid such strenuous and unnecessary efforts. Unquestionably, bothersome local inflammation can be occasioned by failure to avoid this source of irritation. Each pocket in turn is thus filled with the emetin hydrochlorid solution; and the writer believes it to be good practice to apply the solution also to parts which according to gross examination are not involved—as into the interdental spaces and around fixed appliances. Treatments which thus include all recognizable pockets and special parts under suspicion should be repeated daily for at least five days, and thereafter every other day until about ten treatments as a total have been made, as a general rule. Microscopic examination of scrapings from the pockets should be made from time to time for persisting endamœbæ as the treatment progresses, and this, together with the general appearance of the lesions, will determine the appropriate duration of the period of treatment. In some of the less marked and less chronic cases, a total of five or six applications or even less may be sufficient, while in the more stubborn instances treatment must be continued even longer than above indicated.

ADJUVANT IODIN TREATMENT IN REFRACTORY CASES.

In exceptional subjects, response to the emetin treatment has been found encouraging at first, but to be limited. The quantity of pus diminishes in such cases, and the general appearance of the tissues improves. The patients invariably feel better, and there is unmistakable improvement; yet prolonged treatment with emetin does not effect a complete cure. There is obviously something more to be done, as the structures lack desirable "tone." One may suspect that in these cases bacteria of importance remain after the destruction of the endamœbæ by the emetin; as a matter of fact it has been found that a 1 per cent. solution of iodin in normal salt

solution has usually completed the removal of the persisting condition. In the experience of the writer but a single case of this sort has failed thus to clear up, and this instance will be more fully discussed below. The iodin application, following the use of emetin, should be employed daily, the drug being introduced well into the pockets as was the emetin. Good results should follow two or three applications.

There are other instances, too, where the source of suppuration lies in a devitalized pulp, which must of course be dealt with aside from the question of pyorrhea, and preferably by opening the canal. Were it possible to close the external route by remedies such as emetin, this would be of no service, but on the contrary would merely confine the pus about the apex of the root and cause an abscess formation.

SUBJECTIVE SYMPTOMS FOLLOWING EMETIN APPLICATION.

One patient of the entire group which has been under emetin treatment by the writer has vomited after the emetin application; five in all have mentioned a slight sensation of nausea. Three have mentioned the occurrence of headache and a subjective sensation of feverishness, always of brief duration, and occurring only after the first, or first and second treatments. It is notable that these last were all suffering previously from well-recognized gastro-enteric disturbances, and it is quite possible that the real cause is to be found in this latter condition rather than in the remedy. Two of the five cases who were nauseated after the use of emetin are known to have eaten heartily, one of bananas, the other of peaches, just after treatment, which perhaps had some influence in bringing about the undesirable symptoms. In no case, however, were there produced any symptoms of greater severity or significance than here indicated: and the writer has seen nothing to lead him to suppose that serious toxic symptoms are ever to be apprehended in connection with the treatment as here outlined, or that even these are to be expected save in the exceptional instance. On the other hand, the treatment of the oral lesions with emetin has in several instances seemed directly responsible for improvement or cure of conditions elsewhere in the body. One patient, for example, was relieved of a chronic dysentery after the fourth treatment, and is free at the present writing from the disease, which had existed previously for years. (It is not known whether this was an amœbic dysentery—as of course the writer suspects; no examination of the stool is known ever to have been made.) Another patient promptly recovered from a distinct anemia of unknown type, and gained fifteen pounds in less than eight weeks after the treatment of her pyorrhea. Several instances of recovery from symptoms of chronic gastritis have been met with, without other treatment than that given the pyorrhea pockets. The general relation of oral endamœbiasis with anemias and chronic joint disturbances has been referred to more fully in the paper before referred to by Smith, Middleton, and the writer (*q. v.*).

LIMITED EMPLOYMENT OF MECHANICAL FIXATION DEVICES FOR LOOSE TEETH.

Preliminary or collateral to the special use of emetin as an amœbicide, there may be in this or that case of pyorrhea the need of one or more of a number of procedures. The general principle of rest for movable teeth is quite agreed to by the writer; but the question of mechanical fixation must be dealt with only in connection with the individual case, and the common rule of the use of as few mechanical devices in the mouth as possible should certainly be adhered to. Invariably the use of emetin is followed by the disappearance of the pus and the shrinkage of the turgid gums, and increased firmness of the teeth, probably the result of fibrous tissue formation about the roots. Whether eventually reformation of bone follows cannot as yet be told, as sufficient time has not elapsed since the remedy was first applied

to expect such fortunate results. For the most part the writer would prefer to depend upon this natural fixation, which begins to appear early in the treatment, to the employment of definite mechanical devices. Yet there are cases where the extreme looseness of the teeth may require these latter appliances; all cases of faulty articulation should be corrected.

It is best, too, to forego the common practice of pressing the gingival tissue to detect the presence of pus. Pus can be detected quite as well by flushing the pockets; and there is very real danger that, by compression, septic material may be forced from the cavity through the wall into the surrounding tissue, with the result of causing an extension of the inflammatory area.

THE QUESTION OF TOOTH-SCALING.

The question of cleansing the teeth and of removing tartar, again, is an important one. In every instance the procedures must be carried out with the idea of producing as little mechanical disturbance as may be, so as to avoid as far as possible any dissemination of the micro-organisms into the adjacent region and of disturbing any of the delicate tissues which may be in course of regeneration about the root. The writer, in many cases, would not attempt any effort to remove tartar until the tooth has become more firmly fixed, and at best believes that he is proceeding most safely by scaling off only a small portion each day, so that by the time of completion of the period of treatment the teeth will be in a clean condition.

LOCAL AND SYSTEMIC MEDICATION.

As to the influence of general measures of medication and hygiene, the writer prefers to refrain from any but the most general comment. Doubtless, general conditions have an influence upon the dental and peridental tissues, and there is therefore a basis, in cases proved by proper study, for the institution of general treatment for its effect upon the local oral condition. But the writer views pyorrhea as principally and basally a local lesion due to infestment, and finds the local application of remedial measures to be sufficient as a rule. Yet there can be no harm, and in the particular subjects just referred to there will be advantage in general hygienic supervision and in measures directed to improve nutrition, etc.

THE WRITER'S CLINICAL EXPERIENCE.

In all, to the present time, the writer has used emetin as above outlined in seventy-three cases. This does not include the cases now in course of treatment, or several who, for special reason apart from any question of dentistry, interrupted the routine course. Of these seventy-three cases, all but one may be said to have been cured of pyorrhea, and to have now, as far as re-examination has been possible, the peridental tissues in a good healthy condition. By this the writer means that the suppuration ceased after the use of emetin, and, with the few exceptions below referred to, has remained absent (at longest, thus far, for five months). The redness, swelling, bleeding, and painfulness of the tissues have likewise disappeared; in some cases the pockets seem to have filled in with new tissue to a slight extent, although there is not apparent any growth of the gums about the exposed roots. There is clearly no further retraction of the gums; the teeth are uniformly more firmly fixed, and the patients have invariably stated that subjectively the sensations in their mouths are entirely normal. Two cases only of twenty-three cases re-examined recently have shown recurrence —in both instances after about two months. In one of these a small inflamed area was found about the old pocket of a lower left lateral incisor, and pus exuded from the pocket. In the other a similar single inflammatory lesion was found about a lower left molar. In each instance, endamœbæ were detected in the contents of the pocket. The first of these cases was not treated with emetin again, but given a mouth-

wash containing a fluid extract of "chaparro amargosa," a remedy sometimes found efficient in amœbic dysentery. This was done as an experiment at the suggestion of Dr. Smith, the basis of the applied wash being the fluid extract of *chaparro amargosa,* a bitter weed of West Texas and Mexico, used in these districts with excellent results in amœbic dysentery. This case is still under observation and improving. The second case was treated again with emetin as before; and is now well.

A REFRACTORY CASE.

The single case known to have failed to respond to emetin in the writer's list, Miss B., had in the beginning a severe progressive and general pyorrhea, with marked loosening of the teeth, which had been treated by her dentist by fixation by wiring. All about the teeth, embedding this wire, an extensive deposit of tartar had formed; and on removal of the wire from one of the teeth, a left lateral incisor, it fell out. Endamœbæ were, from the first, found in the lesions; and emetin was used, with the result of being followed by marked improvement. But suppuration continues, after six weeks' use of the drug; and the parasites remain, but in greatly diminished numbers. As far as the writer can determine, the parasites are in no wise different from those in other cases. The suppuration has decidedly subsided, the gums are less swollen and the teeth somewhat firmer; but there continues a whitish semi-purulent discharge; a light gray formation, made up of amorphous granular material, is seen by the microscope to coat the gums about the pockets; and neither emetin, iodin, or any other remedy has thus far led to cessation of the process. The patient is now slowly improving with the use of a mouthwash containing chaparro amargosa.

PROPHYLACTIC MEASURES. QUININ AND CHAPARRO AMARGOSA.

Recurrence of amœbic pyorrhea is surely as possible as primary infestment, and, judging from the number of individuals who are found to be hosts to these parasites, it is probable that the opportunities for reinfestment must be frequent. It is not known how this infestment takes place, or what is the source of these parasites, although we may suspect moist uncooked food and water. Prophylactic measures are therefore important, and study should be directed to this phase of the subject. Bass has suggested the use of a few drops of a weak solution of emetin upon the tooth-brush, in an amount too low possibly to cause nausea, should any be swallowed. It is possible this may be effective; but the writer feels that it would be advisable to use some amœbicide free from the nausea-producing action of emetin, so that a fuller and therefore more surely effective dosage may be employed. Quinin, which was used with effect by Dr. James Truman in the treatment of pyorrhea, but not adopted generally because of its unpleasant bitterness, and which is well known as an efficient remedy in amœbic dysentery when used in enemata, might well be the basis of some such prophylactic wash, were its bitter properties sufficiently concealed. From a very limited experience it would seem that the fluid extract of chaparro amargosa, as suggested by Dr. Smith, is of value in destroying the oral endamœbæ, and will be of service as a dental wash; but it, too, possesses a marked bitterness and can never be widely accepted unless this taste is successfully concealed, which thus far has not been accomplished. Should it prove from further trial to merit recommendation, efforts to prescribe it in more palatable form will be made.

MILITIA DENTAL SURGEONS.

By S. D. BOAK, M.D., D.D.S.,
DENTAL SURGEON, U. S. ARMY, WEST POINT, N. Y.

THIS article is written to answer many inquiries received regarding the status of the militia dental surgeons.

It is not generally known by the profession at large that under existing federal legislation all original appointees to the militia dental corps must serve three years as acting dental surgeons (contract dental surgeons) before they can be commissioned as first lieutenants. To quote from the 1913 Report of the Chief, Division of Militia Affairs, in the office of the Chief of Staff, U. S. Army: "Dental surgeons are authorized at the rate of not to exceed one for each thousand of actual enlisted strength. All original appointments to the dental corps shall be as acting dental surgeons, and after three years' service in a manner satisfactory to the governor, or commanding general, District of Columbia Militia, such appointees may be appointed dental surgeons and be commissioned as first lieutenants in the dental corps." This decision is based on the act of Congress approved March 3, 1911, establishing the dental corps of the U. S. army.

Correspondence was held with the adjutants-general of the forty-eight states in regard to the dental surgeons appointed in their militia under existing federal militia legislation, which resulted thus: The following states have appointed dental surgeons: Michigan, one first lieutenant; Iowa, three first lieutenants and acting dental surgeons; Alabama, two first lieutenants; Texas, two acting dental surgeons; North Carolina, three first lieutenants; South Dakota, one first lieutenant; Oklahoma, one assistant dental surgeon; Nebraska, one first lieutenant acting dental surgeon; California and Maryland state that one is to be appointed in the near future. Idaho has less than one thousand troops, and none has been appointed for that reason. Utah states that none will be appointed under present organization. Colorado states that the military board in the near future will recommend the necessary changes to be made in the code to include dental surgeons. Ohio states that under the state laws no appointments of dental surgeons have been made. Delaware states that the militia law of the state does not provide for a dental surgeon in the organized militia of Delaware. The North Dakota code does not provide for the appointment of dental surgeons.

STATUS OF U. S. ARMY DENTAL SURGEON.

Acting dental surgeons, U. S. army, receive pay at the rate of $150.00 per month. They are entitled to travel allowance in obeying their first orders, in changing stations, and in returning to their homes at the termination of service. They are allowed quarters in kind, with regulation allowances of fuel and light, where public quarters are available; they are entitled to commutation of quarters, medical care and treatment during sickness on duty. They have the privilege of purchasing certain supplies from army stores at reasonable prices for their own use.

Acting dental surgeons, like commissioned officers in the U. S. army, furnish their own uniforms, personal equipment, and food. The federal government does not grant retirement to acting

dental surgeons. Commissioned dental surgeons in the U. S. army are entitled to retirement when disability occurs in the line of duty, or for age. Officers of the dental corps have rank in said corps according to the date of their commissions therein, and shall rank next below officers of the medical reserve corps. Their right to command is limited to the dental corps. Each dental surgeon is allowed one enlisted assistant (private or private first class, Hospital Corps).

STATUS OF MILITIA DENTAL SURGEON.

Commissioned dental surgeons in volunteers, like other volunteer officers, are not entitled to retirement under the federal law; but they may acquire a pensionable status if disabled in the line of duty. The pay of both acting and commissioned dental surgeons while with state militia is regulated by the state; the pay of both acting and commissioned dental surgeons serving in camps of instruction under the federal militia law, or as U. S. volunteers, is the same as for corresponding grades in the regular army.

A list of the portable dental outfit prescribed for the army dental surgeon can be obtained by addressing the Surgeon-general U. S. Army, Washington, D. C.

CORRESPONDENCE.

"CALCIUM METABOLISM IN ACIDOSIS."

To THE EDITOR OF THE DENTAL COSMOS:

Sir,—I have read with much interest the valuable paper on calcium metabolism by Dr. Hemmeter in the October issue of the DENTAL COSMOS. There is, however, one paragraph in this essay which to me is somewhat puzzling. The statement is made that "The theory of Dr. Miller . . . . may be true in some forms of caries, but it has always struck me as singular that tartar, which consists largely of calcium carbonate, and which is more soluble in lactic acid than enamel, and which is mostly formed on diseased teeth, should be formed at the same time as the destruction of the teeth goes on."

Tartar is surely not formed mostly on diseased teeth, unless gingivitis is referred to, which has nothing to do with caries, as each occupies its own exclusive field, for the most part. Therefore it is also incorrect to say that tartar is formed at the same time that destruction of the teeth goes on; moreover this entire argument seems to imply the belief that the oral fluids in bulk are of sufficient acidity to dissolve tartar or enamel, as the case may be; whereas the theory of Dr. Miller was that such a concentration is only obtained in a restricted area, directly upon the enamel and protected by a gelatinous film. Besides, it would, I presume, be possible for the oral fluids bathing the mouth to be capable of softening tartar, which possibly they do, and have no effect on the enamel.

He also states, "If tartar is more soluble . . . than enamel, as it really is, we would assume that tartar should protect the teeth." And does it not? although surely not for this reason.

The further statement that caries may be endogenous, or from the pulp, will require pretty strong evidence to support it.

Respectfully submitted by

Yours truly,

W. A. KERRISON.

REARDAN, WASH., October 22.

Proceedings of Societies.

"F. D. I."

INTERNATIONAL DENTAL FEDERATION.

Meeting held in London, August 3, 1914.

The opening session took place on Monday morning, August 3d, in the Jehangier Hall of the University of London, the vice-chancellor of the university, Sir Wilmot P. Herringham, taking the chair.

President's Address.

The President (Mr. W. B. Paterson). *Mr. Vice-chancellor, Ladies and Gentlemen,*—The International Dental Federation meets today for the last time before the opening of the International Dental Congress. Since the last congress, which was held in Berlin in 1909, the Federation has met annually in the following cities. In 1910 we were received in Paris at the Sorbonne by Professor Dastre on behalf of the Minister of Public Instruction. In 1911 we met in London at the Royal College of Surgeons, when Sir Henry Butlin, the president of the college, welcomed us. In 1913 we assembled in the University of Stockholm, and Professor Leche received us. The Stockholm meeting of the Federation will long be remembered by us, from the fact that the King of Sweden received our executive in audience at his palace, and showed by his gracious interest in our proceedings his keen appreciation of our work for the improvement of the health of the people. The royal favor shown to us was the more gratifying because we recognized in Sweden a nation first among pioneers in public dental hygiene, and we remembered also that it was in Stockholm in 1902 that our Commission in Hygiene and Public Dental Services was first established. In 1913 we met at The Hague at the time of the opening of the Palace of Peace, and today we revisit in London the scene of a former meeting of our Federation.

We are fortunate in our visit here today to be received on behalf of the University of London by its vice-chancellor, Sir Wilmot Herringham. Coming, as we do, at a time when term is ended and most people have left town, we appreciate the more the kindness of Sir Wilmot in remaining in London to welcome us.

In the earlier meetings to which I have just referred, we were able through our commissions to devote more time and attention to that side of our duties which consists in extending the relations between the national dental associations represented in our Federation by the promotion of public dental hygiene, dental education, odontological science, and the general interests of our profession. That we have been successful in extending those relations the *Transactions* of the F. D. I. for the quinquennial period 1909 to 1914, published by us, as well as by the world's dental press, will, I think, amply show.

Our meeting at The Hague last year was, and our meeting here today is more intimately connected with our organizing duties as the permanent bureau of International Dental Congresses.

In an assembly like this I need not dwell upon the importance of having

such a connecting link between international dental congresses separated from each other by intervals of five years.

A permanent bureau and advisory body, such as the F. D. I. is, has become a necessity.

Our brethren of the medical profession have discovered a similar need, and have, in consequence, established a permanent bureau for their congresses, with an office at The Hague. The labor of organizing any professional congress is great, and without the machinery which we possess in the F. D. I. it would be one of such stress and strain that I venture to say that few dental associations throughout the world would care to attempt it twice.

Today, gentlemen, your delegates to the Committee of Organization of the Sixth International Dental Congress return to give you an account of their labors since their appointment in 1912. It will greatly depend upon them and the other members of that committee whether congress, when it assembles, will judge this Federation to have performed its organizing duties to complete satisfaction. Meanwhile let us hope that it will be "to our faults a little blind, and to our virtues very kind."

There is another duty of our Federation. I may describe it as the duty of keeping the machinery of congress organization in good order, well oiled and ready for immediate action, or, in other words, the duty of promoting acts of friendship and of strengthening friendly ties between the representatives of the different nationalities. This duty, I claim, our Federation has most successfully done at its annual meetings, and if I may be allowed to strike here a personal note, I should say that kindly feeling, polite consideration, and a spirit of good fellowship have appeared to me to be characteristic of our deliberations. It is often said that "familiarity breeds contempt"; possibly the saying may have an occasional application in the case of national associations, but I have never found it so in international associations. The latter are saved from such a fate by the peculiar charms and idiosyncrasies of international personalities. Long may the novelty and charm of international personality remain to enable us to enjoy an escape from our immediate social environment, and to restore our mental vigor for a return to the ordinary routine of daily life.

Now I turn to the orders of the day. We have much important business to transact and all too limited a time for its transaction. I must set, therefore, an example as to economy of time, and be brief.

At the conclusion of my remarks I shall call upon the representatives of foreign nationalities to this Federation to address us. We generally hear from them the state of dentistry throughout the world, and we are thereby put in touch with the latest political achievements. Afterward I shall call upon the presidents of commissions, who will indicate concisely to us their programs of work.

Then we shall be prepared to give our closest attention to the speech of the Vice-chancellor, who besides being a distinguished officer of this great university, is the highest authority on the organization of an international medical congress in this country, and who, having a keen eye for diagnosis, will by that time have obtained a clear insight into our aims and objects.

That will close our formal proceedings of this morning, and immediately afterward our Executive Council will assemble for business.

Of the business before the Executive Council I shall refer especially to two matters. The first is the biennial award of the Miller Memorial Prize "to the person or persons who have rendered the most eminent services to dentistry." This will be the third occasion of the award. But it is my intention to ask the Executive Council not to proceed with the award of that prize for this year. Owing to the circumstances in which we find ourselves, it is impossible to bring together an international jury to decide such an award.

The second important matter for the Executive Council to decide is the place and date of meeting of the next, or Seventh International Dental Congress,

and we have received already certain invitations from Europe and America.

I will now say a word or two about the duties which lie before your executive staff. Your executive officers have to clear up the affairs of their respective offices, and to leave all in order for their successors, whom we shall hope to see appointed at our meeting on Saturday next after the close of the congress.

Speaking for your executive officers, I may say that we feel in leaving office we are leaving with clear consciences as having tried to do our duty to the best of our ability. We are pleased to think that we are leaving a clean slate for future work to our successors, as well as a balance of cash at our bankers' to help start them upon their career. This useful item of finance we owe to the faithful guardianship of the F. D. I. purse by our worthy hon. treasurer. It is the first time in the existence of the F. D. I. that we shall commence a new quinquennial period with a balance of cash in hand, and I trust that it will be remembered to our credit and be further improved upon by our successors. Had we possessed in the past a capital fund at our bankers' our efforts would have been greatly multiplied in potency.

In accordance with a resolution passed at our last meeting, I have appointed a member of the F. D. I. to represent us at the opening ceremony of the Evans Institute and Museum in Philadelphia in October next in the person of Mr. Hopewell-Smith, who is leaving England to take up the position of professor of dental histology and comparative odontology in the Dental Department of the University of Pennsylvania.

I have to announce that Dr. L. Guillermin, of Geneva, one of our oldest members, has resigned, consequent upon his retirement from active practice. Dr. Guillermin's assistance has always been valued by us. When prevented from attending our meetings he has frequently contributed his carefully reasoned opinion upon the subject matters of debate. If we had a list of honorary members —and we have the power to make one under our rules—Dr. Guillermin is one whose name might worthily be inscribed upon it. Meanwhile I have expressed to Dr. Guillermin our regrets in accepting his resignation and our good wishes for his future welfare.

The acting secretary will announce the adhesion of another country to the International Dental Federation. New Zealand has now an organized National Dental Association which seeks to join us. I have welcomed to this meeting the two representatives to the congress, Mr. T. A. Hunter and Professor H. P. Pickerill.

I shall now conclude my remarks with a personal reference. Before I became your president I was fully conscious, as I still am, of my linguistic deficiencies. At one time I had hopes of Esperanto saving me, but, alas! it was not to be. Besides, this defect is ingrained in the Anglo-Saxon character, and our traditional methods of education have much to answer for it. But be it as it may, I hold that to be a completely efficient president of an international Federation like ours one should be master of at least French, German, and English. My predecessor, Professor Miller, fulfilled this ideal. I sincerely hope that my successor will, for his own sake, be better endowed than I have been in this respect.

I cannot conclude without expressing to my colleagues, the officers of the Federation, my most cordial thanks for the very able assistance they have always given me. I have never worked with any body of men who have shown me greater amiability, loyalty, or the spirit of true *camaraderie*.

To you, my friends and colleagues of the F. D. I., I owe a debt of gratitude for your patience and tolerance of my rule during the past five years. Any success that has been mine has come entirely through you. My deficiencies in the knowledge of your languages have been more than counterbalanced by your knowledge of my language; and working together, for the welfare of our profession and for the public good, we have, let us hope, done something toward the promotion of one of the chief objects of our Federation—the promotion in dentistry and among dentists of international solidarity.

Now, sir, I have in the ordinary course to call upon the representatives of the different National Dental Associations of various countries in the world. I have to call first upon Austria, and I have to say that there is no representative of Austria present. I then call upon Germany, and I have again to say there is no representative of Germany present. Russia: I have again to say there is no representative of Russia present at the moment, although some forty or more Russian dentists are known to be on their way here. Denmark: the representative left last night. Holland: there is no representative of Holland present. Belgium: I regret to say that our worthy treasurer, Dr. Rosenthal, had to leave hurriedly this morning for Brussels. I come, therefore, to what I might call our kith and kin, who will form the greater portion of the members of congress from abroad.

Mr. J. Howard Mummery (president of the Congress). On behalf of my British colleagues, I bid you welcome today to the meeting of the International Dental Federation. We have reached the last day of our term of office as members of the Organizing Committee, and, by the laws of the Federation, are today dissolved in the International Dental Congress. We had greatly hoped that this congress, the first to be held in Great Britain, would have been a thoroughly representative one, both in numbers and in importance, but the serious crisis which has arisen on the Continent not only has deprived us of many of our important delegates, but has drawn attention away from our proceedings and has deprived us of much public recognition, which is of so much value in drawing attention to the ethics of the profession and to the cause especially of dental hygiene. We had hoped that the advance of civilization had rendered such a situation as the present impossible, but we have been sadly disillusioned. It is all the more necessary that we should all use our best endeavors to make this congress a success despite these adverse conditions: for medicine and science know no politics and no nationality, and must steadily pursue their way under all conditions and in all circumstances. The friendship and mutual regard fostered by these meetings enable us to meet as brethren in a common cause, whatever our country or our national differences may be.

Dr. Truman W. Brophy (Chicago). It is with a heart full of sorrow that I rise to address you, following the announcement that so many of our colleagues who have been with us in previous years are not here now. The cause of their absence is known to all. America responded to the call of this congress, and we have with us many members of the profession from our country. We came to participate in the deliberations because we wished to gain that information so essential to our progress. The position of America in dental education and in dental advancement has undergone quite a remarkable change since the inauguration of the work of the F. D. I. In the early development of dental education in our country our work was largely crude—largely practical. The scientific side of it did not attract our attention as it should have done. In Europe we looked for scientific investigations, for laboratory work, and for the development of the science; but today, with the establishment of so many institutions of scientific research, we are making, we believe, the greatest progress we have made since the beginning of our educational systematic working. We have the great institute in Boston, the Forsyth Institute, with a foundation which is absolutely reliable, with financial backing sufficient to insure the employment of the best of men and the most satisfactory work. Then the University of Minnesota has inaugurated a laboratory for original research work. The University of Pennsylvania, through the Thomas W. Evans Institute, has prepared to engage in careful scientific work, in connection with which a distinguished gentleman, whose name was mentioned a few moments ago, Mr. Hopewell-Smith, will be an important factor. Other institutions in the United States have taken on this work, and we

trust it will be carried on in a manner satisfactory to all. In oral hygiene we have made, we believe, remarkable progress. Our cities and smaller villages have, through their officials, appropriated funds for the carrying on of this work, and now we see it moving and increasing, so that the wave of oral hygiene which has passed over the world has come to America and made its impression. Again, Mr. President, we feel that our people in the profession are loyal to the International Dental Federation. The feeling of uncertainty, the misunderstandings which existed in years gone by, have been, by reason of the faithful work of this body, swept away, and today we see a class of men, representatives of the profession, standing loyally together and understanding the objects and aims and powers of this body. We sincerely trust, though this Federation is meeting today with a great disappointment in the matter of the attendance of the members, who have up to now never failed us, that the cloud may pass and the brilliancy of the sun may raise us up in our work and the illumination of the past may come to us again, that we may meet in unison, and in harmonious relations, and that we may be lifted out of our troubles.

America is always ready to support a noble movement. America is with the International Dental Federation, and we trust that the next session may be held in our own country, when we may show you in a more substantial manner than I can by mere words that we are loyal to this body, and support it to our fullest extent.

The President (Mr. W. B. Paterson). I should have called upon the representative of France, but there is no representative of France present. I also intended at this particular moment of the Federation's meeting to interpolate a small matter which I should have asked you, sir, to be so good as to deal with. However, I wish to show you and the members present the Miller medal which we intended to present to Dr. Godon. The medal is here, but Dr. Charles Godon of Paris, the recipient to be, is not. We must, therefore, deal with this matter in another manner at another period.

Dr. E. T. White (Australia). I come from Australia with the hearty good wishes of the National Dental Association. I think we are one of the latest additions to the International Dental Federation, and this is our first appearance at its meetings. I might say, since the Federation is so closely connected with congresses, that our uplifting dates from the occasion when Australian dentists decided to hold their first congress. Previous to that we were divided throughout the various states of Australia, but on account of the first congress we got so close together that we thought it would be a good thing to form a national association. That National Association has only been in existence for two years, but even now we can see the uplifting effects it is going to have on the profession in Australia. Another big element which helped us to raise our heads a little was the presence of delegates from both America and England at our last congress. All these events have tended to make the profession in Australia go ahead in a manner which is in every way satisfactory. Like the other speakers, I am very sorry to see that the present is not one of the large representative meetings which you generally have. I had been in great hopes of being able to carry back much of the spirit of this body. I have followed the transactions very closely in the Journal, and the impression which they have given me is that, although the nationalities are mixed, there is no selfishness in any of the arguments. The main object of the Federation is to do the best which can be done for the dental profession. I think when a body of men like that which composes this Federation is brought together, it is going to be a very big power in the uplifting of the dental profession. I thank you.

Dr. Guerini (Italy) conveyed salutations and good wishes from Italian colleagues.

The President. I am sorry to say that representatives of Japan and Nor-

way are not present at this meeting, although expected.

Dr. Sten Hager (Sweden). The past years in Sweden have been very good years for our science and for our profession. The Swedish government is very much interested in the improvement of public health by means of dental hygiene in schools and in the army and navy. We feel that in all our work for upholding the interests of the profession we have the good wishes of the F. D. I.

Dr. Florestan Aguilar (Spain). I bring you greetings from the Spanish National Dental Association, and I hold also the representation of my government. During the past year I am glad to report that our curriculum for dental teaching has been modified, and the modification will date from the commencement of October. As in some other continental countries, professional education in Spain is controlled by the government, and a royal decree has been published modifying the courses of studies in accordance with the petition of the professors of the dental department of the University of Madrid. I am very pleased also to report a great improvement ethically, governing our profession. The practice of sanitation in Spain is governed by the sanitary law. The control and proper exercise of the provisions of that law are in the hands of provincial sanitary inspectors who are physicians, and who, in each province, are given powers to a certain extent of imposing fines and prosecuting persons for illegal practice. At the petition of the dental profession, dental sanitary inspectors have been appointed by the government in each one of the forty-nine provinces. Members of our profession have been entrusted with similar powers to those of the sanitary inspectors for the prosecution of illegal practice, with full power to impose fines, and to prosecute, in the name of the state, those illegal practitioners. In dental hygiene also we have made good progress. The petition formulated by our National Association two years ago was received, as the French say, *au bon cœur,* on the part of the government. At the time of the organization of the Obligatory School Health Investigators—that is the literal translation of the name—the state of health of children attending the public schools was controlled by inspectors appointed by the government, but to the corps of medical inspectors dental inspectors have now been appointed, and the inspection of the teeth of children has been compulsory by law since June 1st of the present year. I think that is a great achievement for us to have obtained. Last, but not least, I am officially empowered by the minister of Public Instruction to convey to the International Dental Federation an invitation to hold the next meeting of the congress in Spain. The invitation is made not only on the ground of the pleasure which we in Spain would have in receiving this body, but also as calling the attention of the bureau of the International Dental Federation to the fact that up to now all previous international dental congresses have been held in countries speaking English, French, or German, and that Spanish-speaking countries have not had the privilege of receiving the International Congress. I am therefore very pleased to be the bearer of the invitation from the minister of Public Instruction to the International Dental Federation.

Dr. J. S. Burnett (Uruguay). Although it is many years since I have been able to visit Europe, I have never lost interest in the F. D. I., of which I have been a member ever since its initiation in Paris in 1900, and have followed its movements and the work of its active general and sectional committees right through all these years, at least as far as it has been possible at our distance. I now have the pleasure of bringing hearty greetings from the Sociedad Odontological del Uruguay. I registered it as a member of the Féderation Dentaire Internationale in 1904, and sent the first remittance; I have tried to keep the society in close contact with your work—although I must say here, while I think of it, that the Sociedad has never received communications direct from the F. D. I. I always try to keep up the interest of Uruguayan dentists

in the work of our foreign *confrères,* and, as I am convinced that the best way to interest people is by touching their pockets, I never lose an opportunity of doing so. For example, when we lost our Miller, and the International Miller Memorial Fund was initiated, I called a meeting, and the Sociedad Odontological del Uruguay and various dentists responded to the call, I think handsomely, considering how small our community is. This has contributed to keep up the interest in our European brothers and their work. The Sociedad Odontological del Uruguay has been in existence since 1900, and its various committees have never lost an opportunity of furthering the interests of dentistry, procuring through the authorities continual improvements in our standard. Through the propaganda of our society we have been able to get improvements from time to time in our clinics and prosthetic laboratories. Our present plan of studies is really good, and will be materially improved next year. Our plan will soon be altered to a four years course. As all serious alterations in the plan of studies and increase in the number of professors have to be sanctioned by parliament, it has taken a great deal of time and perseverance on the part of some of our members to get as far as we have. I will not read you over our plan of studies now, in order not to take up your valuable time. On starting our new plan we intend to secure a semi-autonomy for our dental school and hospital. I should not like a complete separation from the Faculty of Medicine; I think it is an advantage that we should be a dependent of that institution, for I believe we can do more good to humanity if we work with the medical profession. If the dentist requires a little more general medical training, I believe the medical man requires a great deal more dental knowledge, or training, that he has: to reach this aim I think it is for the mutual benefit of our dental students to let them grow up together with the medical students, so to say, on the same intellectual and social footing, to be able to sustain the position which, through the work and propaganda of the F. D. I., we are acquiring all over the world. We cannot afford that our boys should have less literary and scientific instruction than any other profession. The days of empiricism in dentistry are over. I notice that the higher the standard of our studies the better the class of men who join our ranks, and although at first we may feel that the number of students diminishes, the reaction soon sets in and better men join our profession in sufficient numbers to fill the ever-increasing demand for good dentistry. This year we have a matriculation of seventy dental students, all young men who have received their bachelor degree, so we hope to turn out as good a set of professionals as any other college. In 1916 the second Pan-American Congress will take place at Montevideo, when I hope really serious and good work will be done. I am authorized by the Organizing Committee to invite the F. D. I. to assist. I will finish by tendering my sincere congratulations to the various commissions of the Fédération Dentaire Internationale for the great work they have achieved these last few years. My opinion is that dentistry and humanity at large owe a great debt of gratitude to the Fédération Dentaire Internationale.

Sr. Juan B. Patrone (Argentine), who spoke in Spanish, offered on behalf of his *confrères* in Buenos Aires and other parts of the Argentine Republic the testimony of their appreciation of the objects and work of the F. D. I. and their good wishes for their success.

The President. I will now call upon the representative of New Zealand, in the person of Mr. Hunter, the president of the National Dental Association, the latest association applying to join the Federation.

Mr. Hunter (New Zealand). If I attempted to give even a brief *résumé* of the progress of dentistry in New Zealand, I am afraid it would take up an enormous amount of your time. I have seen the progress of dentistry in New Zealand from the time when anyone could call himself a dentist and practice dentistry—even a blacksmith—up to

the present day, when we have a university training and a degree which is recognized all over the British dominions and which allows the holder to practice. I had the honor to assist to a certain extent in preparing the syllabus of dental education. I think we are the only university—British, anyhow—which makes it compulsory for a medical man to go through a course of stomatology before obtaining his degree. I suggested such a course in the public press, and Professor Pickerill, who came out to us—and we were extremely fortunate in getting out to our university such a man as principal—was very keen on the idea and he worked till he obtained it. It seems to me to be almost necessary for a medical man to have some idea of stomatology before getting his degree. With regard to our admission to the F. D. I., we have had a National Association for some time, and we think now that the boy is big enough to ask to come in and be received into this great family, which commands our great respect and which we hope will help us in our work out there.

Dr. Edward C. Kirk (president of the Commission on Education): During the past week it has been my privilege to see among other things in the city of Paris, a statue, near the Sorbonne, of Danton, upon the pedestal of which is his axiomatic and prophetic statement that "After bread, education is the first need of the people." It seems to me that it is somewhat in the same spirit that the study of education as related to our professional needs was taken up by the International Dental Federation. Under the presidency of my distinguished predecessor, Dr. Brophy, the Commission on Education concerned itself mainly with what we may call the content of the dental curriculum. What was it necessary for a dentist to know? In the course of time, through the helpfulness of the deliberations of the representatives from various countries composing the Commission on Education, the commission was able to announce a form of curriculum, with a recommendation for its acceptance by the dental educational institutions of the world; and then we proceeded to the second phase of our study, the underlying question of that being, What shall be the relationship between the scientific, theoretical and didactic teaching and what we call the practical laboratory teaching in dental art? That has been the central question before the Commission on Education up to the present time. The president of the commission has been requested to secure from various dental educational institutions an expression of opinion as to this underlying question, so that it may be brought before the commission for consideration. The result of that investigation has been somewhat confusing, because the views expressed by various prominent educators upon that problem have been at variance. In the meantime there has been, as I view it, almost a revolution in our attitude of mind as educators toward our problem. The data of dental education have been changed, have been undergoing development, and as a result we have had a different angle of view, so that from the reports coming in it seems to me that the one thing which is giving concern to dental educators today is not so much the question of the technique of dental art, nor its mechanism, not the modes of constructing dental restorations, but more particularly the vital reactions of the body upon which that mechanism is placed; in other words, What has the physiological side of the problem to say with regard to the mechanical side? That, I think, is the point we have to discuss in our further deliberations at this meeting.

I am sure we are all imbued with the importance of the educational problem, and I am sure we all here are hopeful, as we take up the work, that we shall receive from all the various national representatives who are present, their help in the solution of this problem, which, after all, means the betterment of dental service and the more efficient service which we can render to humanity within the limits of our calling.

SIXTH INTERNATIONAL DENTAL CONGRESS.

Held in London, beginning August 4, 1914.

GENERAL SESSIONS.

Opening Meeting.

The Sixth International Dental Congress was opened in Central Hall, Westminster, on the morning of Tuesday, August 4, 1914, under the presidency of Mr. J. Howard Mummery, M.R.C.S., L.D.S.

A note of regret was struck at the beginning of the meeting by the announcement made by Mr. H. R. F. Brooks, one of the general secretaries, that Mr. Herbert Samuel, the president of the Local Government Board, was unable officially to open the congress. A telegram had been received from him, as follows: "I greatly regret that in circumstances now existing it is impossible for me to attend the opening of the congress tomorrow. I wish every success to the meeting."

The President said that the following telegram was being sent to his Majesty the King: "This meeting in London of the Sixth International Dental Congress, mindful of your Majesty's devotion to and interest in science and humanity, begs to send its dutiful homage and warmest expressions of respect and gratitude."

A telegram arrived from Buckingham Palace in reply, reading as follows: *"To the President, Sixth International Dental Congress, Imperial Institute,*—I am commanded by the King to thank the members of the Sixth International Dental Congress for their kind telegram.—Stamfordham."

The President deeply regretted the circumstances which had prevented Mr. Samuel's opening the meeting, and on behalf of the congress offered his sincere thanks to Mr. Samuel and the heads of the government departments, not only for their personal kindness in connection with the arrangements for the congress, but for the evidence which that assistance afforded of the interest taken by the state in all movements which tend to the welfare of the community.

He then on behalf of the British colleagues welcomed the delegates, and sincerely hoped that the congress would be fruitful in useful work and would assist in promoting a better understanding among the nations. [Cheers.]

The President then delivered his presidential address.

[The President's address was printed in full at page 1160 of the October issue of the Dental Cosmos.]

Mr. W. B. Paterson (president of the Internationl Dental Federation) also welcomed the delegates. He regretted that the catastrophe of war had deprived the congress of members from four of the largest countries in Europe, besides six smaller states. But for that, he believed, the congress would have been a record one among international dental meetings. Notwithstanding the diminution in number, however, he ventured to assert that the congress would be found sufficiently representative of all that was best in the science and art of dentistry. Dental science was international; war could not stop its progress for the benefit of humanity. Furthermore, war could not destroy the friendship of the delegates. Great Britain would endeavor to make the delegates' stay in London socially pleasurable, and he was sure the congress would make it eminently valuable from a scientific point of view. [Cheers.]

Brief speeches were then delivered by

many representatives of the British colonies and foreign countries. The first called upon was

Dr. E. T. White, who represented the National Dental Association of Australia and the Dental Board of New South Wales, and also the Odontological Society of Western Australia and Queensland. He mentioned that three small congresses had been held in Australia. Previous to the first, dentists in that country were almost a disorganized rabble, but since that time the whole of Australia had been brought pretty well into line, and the dentists of the country were beginning to feel they were a pretty strong body and could approach the governments of the various states with some effect. Anything he could take back from his visit to the congress would be greatly appreciated on the other side of the world.

Prof. H. P. Pickerill, as the representative of New Zealand, said that country was the youngest to be affiliated to the International Dental Federation, but it took the keenest interest in all the proceedings of the International Congress. It was a source of great gratification to know that New Zealand was now part and parcel of the Federation. Dental surgeons there were striving to maintain the ideals mentioned by the president in his address, and to live up to a high standard, and the profession was now thoroughly organized and unified throughout the country. [Cheers.]

Dr. A. J. McDonagh (Canada) said Canada had nearly 2000 well-equipped dentists and three good dental colleges. The profession was not as large as the dental profession in the British Isles, but it had begun to build itself up on scientific principles. In the past the dental profession in Canada had been separated from the medical profession, but in the last few years the two professions had been coming more closely together, because it had been found in Canada, as in other countries, that the health of the whole body depended materially on the health of the integral parts of the oral cavity.

Dr. Wm. Johnston (South Africa) said his fellow delegate and himself were present at the congress not to teach but to learn, and he believed that what they would learn would be in inverse proportion to the length of his speech.

Sr. Juan B. Patrone (Argentine Republic), Dr. Hjalmar Avellan (Finland), and M. L. Cocoris (Greece) addressed the congress in Spanish, Finnish, and German respectively.

Dr. Vincenzo Guerini (Italy), in expressing his pleasure at being present at the congress, exhibited a bronze bust of the late Professor W. D. Miller of Berlin, which he had kindly brought with him for the purpose. He said that he had prevailed upon Professor Miller, on a visit to Italy two years before his death, to pose for a bust to be modeled by one of the first sculptors of Naples. He had presented a representation in marble to Dr. Miller himself.

Dr. Thol. Shmamine (Japan) said it was the first time that the Japanese government had been officially represented at an international dental congress, and it was a source of the greatest satisfaction to him to be present, not only on that account but also owing to the fact that the congress took place in the capital of a great nation with which Japan had such close relations. [Cheers.] The Japanese government had followed with keen interest the progress of science in many departments, and their interest would be quite as keen in the science of dentistry, which was of such great importance for the general hygiene of the people.

Sr. Don Miguel Denegri (Peru) spoke in Spanish.

Dr. M. A. Minker expressed the greetings of the National Dental Federation of Russia.

Dr. Florestan Aguilar spoke in the name of the Spanish government and the Spanish Dental Association, and hoped the congress would mark another great step in the progress of dentistry.

Dr. Sten Hager, representing the Swedish government and the Swedish Dental Society, presented greetings, and said the Swedish government had accepted the invitation to send a represen-

tative to the congress with very great pleasure.

Dr. ARTHUR LEUTY brought greetings from Egypt, where, he said, owing to the cosmopolitan nature of the country, a dental society had only come into being in April last.

Dr. J. S. BURNETT (Uruguay) said the Dental Association of Uruguay had done and was doing a great deal of good to improve the conditions and status of the dental profession in that country, and the president and committee of the association had authorized him to express their heartiest wishes for the success of the congress.

Dr. H. J. BURKHART spoke on behalf of the National Dental Association of America, composed of representatives from the various state and territorial societies of the United States. Since the congress held in Berlin five years ago, the profession in America had received government recognition to the extent of the formation of army and navy corps, had been recognized by the various state governments by being placed upon state boards of health, and had been established in the schools under the municipalities. The science of oral hygiene had received a very marked impetus by reason of the campaign which had been carried on by the dentists of the United States. At present there was an agitation for increasing the three years' course to four years, and he believed that before another international congress was held, such extension would have been brought about.

Dr. HORTA (Brazil) and Dr. CHACIN ITRIAGO (Venezuela) also addressed the meeting on behalf of their respective countries.

The PRESIDENT, in declaring the meeting closed, said he had unfortunately to announce that owing to present conditions the government was unable to give the congress the dinner which had been arranged, and for similar reasons the banquet at the White City had also to be abandoned.

The meeting then adjourned until the afternoon.

AFTERNOON SESSION.

In the afternoon the general session was held in the Central Hall, Westminster, the president, Mr. J. Howard Mummery, occupying the chair.

The PRESIDENT explained that the afternoon sitting was to be devoted to scientific addresses from the delegates of different countries. Unfortunately, Dr. M. Roy, director of the Ecole Dentaire de Paris, who was to have delivered an address on "The Pathological Origin and Prophylaxis of Pyorrhea Alveolaris according to Clinical Data," was unable to attend, and for the same reason Hofrat Prof. Dr. O. Walkhoff of Munich, who was to have delivered the second address, on "The Jaws and Teeth of Prehistoric Man, and Their Importance in Human Evolution," was also absent.

An address was then delivered upon "The Tendencies in Dental Education," by Dr. E. C. KIRK, dean of the dental faculty, University of Pennsylvania.

[This address is printed in full at page 1297 of the present issue of the DENTAL COSMOS.]

On motion of the President, a hearty vote of thanks was accorded to Dr. Kirk for his excellent address.

The second, and last, address delivered at the session was upon "Narcosis," by Dr. W. GUY, dean of the Edinburgh Dental School and president of the British Dental Association.

[This address is printed in full at page 1293 of the present issue of the DENTAL COSMOS.]

On motion of the President, a hearty vote of thanks was accorded to Dr. Guy for his excellent address.

The general session of the congress then adjourned.

CLOSING MEETING.

The closing meeting of the congress was held in the Jehangier Hall, of London University, on Thursday afternoon, August 6, at 4.30 P.M., when Mr. J.

Howard Mummery (president) took the chair.

The President said it was with the utmost regret that the Committee of Organization had come to the conclusion that it was absolutely necessary to close the congress before the appointed time. They were all aware of the very exceptional circumstances under which they had met, and it was really impossible to carry on the business of the congress under such conditions. They had lost nearly all the members from the Continent, and of the few who came many had had to return almost immediately. He thought they would agree with him that the Committee of Organization had done their best to make the congress a success, but circumstances had been altogether adverse. Nevertheless, they were very grateful to all who had assisted them in every way.

Mr. W. B. Paterson, in response to an invitation from the Chair, said the first item in the agenda was the consideration of "Resolutions presented by Sections." Section X had presented the following resolution to be recommended to all teaching bodies:

> That newly appointed teachers should possess certificates of proficiency in pedagogics (the principles and methods of the science and art of teaching), and that, to further that object, suitable literature be prepared.

The Executive Council of the International Dental Federation, to whom the resolution has been submitted in accordance with the rules, did not consider the resolution a suitable one to be brought before the closing meeting of the congress for a vote; they thought, however, that the resolution was eminently suitable to be remitted to the Commission on Education of the F. D. I.

The resolution was so remitted.

Coming to the next item on the agenda, viz, "Presentation, on behalf of the F. D. I., of its List of Members, Rules, and Statement of Accounts," Mr. Paterson (president F. D. I.) said that owing to the sudden termination of the congress, and the absence of the treasurer (Dr. Rosenthal, who had returned to Brussels) he was unable to present the accounts, but he believed they had 3000 francs in hand. However, he made formal presentation of the Rules and List of Members. The names of Professor Pickerill and Mr. T. A. Hunter, representing the New Zealand National Dental Association, which had joined the Federation on August 3d, were to be added to the list of members of the Executive Council.

The President said their gratitude was due to H. M. the King for sending a telegram of good wishes to the congress.

The General Secretary then announced that their thanks were also due to Right Hon. H. Samuel, president of the Local Government Board; Right Hon. the Earl Beauchamp, First Commissioner of Works; Right Hon. Sir E. Grey, Foreign Secretary; Right Hon. L. Harcourt, Colonial Secretary; Right Hon. H. H. Asquith, Secretary for War; Right Hon. Winston Churchill, First Lord of the Admiralty—they had helped the congress in many ways; to the Senate of London University and the Governors of the Imperial College of Science and Technology, who granted the use of their buildings; to the Lord Mayor and Corporation of London, also the president and council of the Royal College of Surgeons, for their kind hospitality; to the governors and dental staff of Guy's Hospital, for kindly throwing open the hospital to congressists; to the British Dental Association, for inviting the congress to London and for their untiring work on its behalf; to the Ladies' Committee, the Reception Committee, and to all who had in any way assisted in the arrangements for making the visit of congress members enjoyable.

On the motion of the President, the comprehensive vote of thanks to those named was carried unanimously by acclamation.

Mr. Paterson stated that the Executive Council of the F. D. I. had decided to recommend the acceptance of the invitation from the Minister of Education

of Spain to hold the next International Congress in Madrid, in 1919, the precise date to be decided hereafter.

Mr. Matheson said he was about to propose a resolution, which might cause some surprise and perhaps dissatisfaction, but which, nevertheless, he hoped would meet with the warm approval of that meeting. All in England, especially those connected with the organization of the congress, had hoped that the congress would have achieved great things for dentistry in this country. However, instead of the great success they had anticipated, the congress had proved, owing to circumstances beyond their control, a great failure. But Englishmen did not like being beaten. He therefore moved—

That in view of the extraordinary and exceptional circumstances which have so disastrously affected the success of this congress, it is proposed that the congress be not now terminated, but adjourned; and it is hoped that the International Dental Federation will see its way to permitting this departure from the ordinary course of procedure.

He desired to point out that if the congress terminated that day, they would not have had an opportunity of showing what an International Dental Congress in London ought to be. Naturally there were objections to that course, and many of those present would like to go to another place, having seen London this year. If they asked for the adjournment of the congress for two or three years, it might be said that they were interfering with the work of the F. D. I. and not dealing kindly with their Spanish friends. Still, he thought the latter would realize that Englishmen only wanted to do for dentistry what they had hoped but had failed to do. He knew that an adjournment might make matters somewhat difficult, but extraordinary circumstances called for extraordinary treatment, and he believed there need be no difficulty in getting over matters of procedure. Those who had borne the burden and heat of the day were amongst those who most earnestly desired this course to be taken and were prepared to do their share of the work again.

Mr. Norman G. Bennett seconded the resolution proposed by Mr. Matheson. He said that it was indeed a sad ending of the congress, the only congress that had ever met—and he hoped the only congress that would ever meet—under such conditions. It would ill become him, who had been responsible to some extent for the preparations for the congress, to refer to the work which had been done, but he was sure that all present would sympathize with them in their share of the common disappointment. However, as Mr. Matheson had said, they did not like to be beaten, and desired to try again under happier circumstances. He therefore looked forward to the brighter days, when the war-clouds had passed over Europe, and they could again welcome the congress in London, especially those of their friends in the profession throughout the world who had been prevented from coming on this occasion.

Dr. F. Aguilar said he wished to express his deep sympathy with the speech of Mr. Matheson. At the same time, on behalf of the Spanish government, he tendered a cordial invitation to meet in Madrid in 1919. He had no objection to Mr. Matheson's proposition; on the contrary, his Spanish colleagues and he himself were anxious to see the English profession benefit by the opportunity of the congress meeting in London again. Still, he was bound to point out that they were taking a decision on an international question without having an international meeting. He considered that a motion simply to adjourn would be in order, without taking further steps, and he thought the Executive Council of the F. D. I. would decide in accordance with the wishes of their English friends. He suggested that they should merely propose to adjourn the congress, without taking further decisions of an international character when international members had no opportunity of expressing an opinion.

Mr. H. R. F. Brooks said he was sure they all appreciated what Dr. Aguilar had stated. Under ordinary circumstances, their proper course, no

doubt, would be to give every opportunity to the Executive Council of the F. D. I. to discuss this question, and also to give every member sufficient notice. The difficulty was that they were hardly likely to have so many present at another meeting as now. In conducting the congress they had been handicapped by circumstances which had prevented the attendance of hundreds of members. He asked them to sanction the postponement of the congress—he could not mention the time, because it would be impossible to specify a suitable date within the next two years. He felt that the Committee of Organization ought to have another chance; he believed that under ordinary circumstances they would have made the congress a very great success. He thought he was not going too far in saying that it would have been the most successful congress on record, and that it would have done much to advance dentistry and the interests of the dental profession in this country and throughout the world. No previous congress had received such important official recognition. The committee asked the meeting to postpone the congress that it might be continued when circumstances were more propitious. He hoped it would be possible to accept the kind invitation that had been received from Spain, and he anticipated a successful meeting in Madrid, probably (might he say?) under the presidency of Dr. Aguilar.

Mr. Matheson pointed out that the resolution said nothing about meeting in England, but referred this matter to the F. D. I. itself.

Mr. Badcock said he should like to support very heartily Mr. Matheson's proposition. He would add that previous congresses had experienced a great deal of continental hospitality, and Englishmen were anxious to return that hospitality. They had been unable to do so on this occasion, not owing to want of will but through lack of opportunity.

Mr. E. T. White (Australia) said it was a very serious question. They must all admit that Britishers had done everything in their power to bring the congress to a successful issue, and, under present conditions, everything had been carried out to the best of their ability. The proposition meant "a second bite at the cherry," and he did not consider it was practicable, apart from the financial difficulty and the risk of encroaching on the Seventh International Congress in 1919. All members realized the tremendous amount of work that had been done. If the present conditions would not permit them to enjoy all the social arrangements that had been planned, that was not the fault of the organizers. Personally, he felt that the congress had not been a failure, but that as much had been done as could be expected.

Mr. Paterson said that the Executive Council of the F. D. I. had no idea that it was the intention of the Committee of Organization to make such a proposal; otherwise they might have made a different recommendation to that meeting.

The President said it was inevitable that the proposal should appear to be "sprung upon them." The committee could not give longer notice owing to the difficulty of the situation.

Mr. Paterson did not complain of the short notice; he only wished to justify the action of the F. D. I.

Dr. Aguilar presumed that an adjourned meeting would be a continuation of that congress. He asked Mr. Matheson to add to his motion the words

—and fix the date for renewing the proceedings.

Mr. Matheson replied that he was not bound to the exact wording of the motion, which was intended to deal with an unprecedented situation. He only wished to express that they did not consider the congress completed until they had had a further opportunity.

The President then put the motion, with Dr. Aguilar's addendum, to the meeting. It was carried by forty-three votes to six.

In saying *au revoir*, the President concluded: As Mr. Matheson has said, and as I pointed out in my opening address, we hoped for great things from the con-

gress, which was being held at a very important period in the history of dentistry in this country. We have been long seeking to obtain more complete recognition by the state and by the public of the great importance and value of our work for the well-being of the nation at large. This opportunity—a great one—has been lost, and we are all very disappointed that most of its efforts for good will be dissipated. The Committee of Organization had done everything in their power to insure success, and I think if the congress had been carried out as we had hoped it would have been a great success, especially for the purpose to which I have alluded. But the terrible circumstances in which we find ourselves—launched on a war which promises to be the most widely extended in history—have taken everything out of our hands. I accordingly adjourn this congress, according to the terms of the resolution just passed, and cordially bid you *au revoir*.

The meeting then ended.

Note.—The papers presented in the various sections of the Sixth International Dental Congress will appear in the pages of the DENTAL COSMOS. Of Section I (Dental Anatomy, Histology, and Physiology), the paper by Mr. John Humphreys, on "The Evolution of the Human Dentition," was printed in COSMOS issue for November, at page 1205.

SUSQUEHANNA DENTAL ASSOCIATION OF PENNSYLVANIA.

Fifty-first Annual Meeting, held at Delaware Water Gap, May 26-28, 1914.

(Continued from page 1263.)

WEDNESDAY.—*Morning Session.*

The meeting was called to order at 10 o'clock Wednesday morning by the president, Dr. Middaugh.

The first order of business was the report of the chairman of the Oral Hygiene Committee, Dr. H. M. BECK, Wilkes-Barre, who reported to the society upon the use during the year of the motion picture film owned by the society.

The next order of business was the report of the Board of Censors, who reported favorably on the following applicants: Drs. J. C. Detwiler, Easton; R. M. Wall, Bethlehem; and F. M. Bitenbender, Bloomsburg.

The President announced as the next item on the program the reading of a paper by Dr. H. C. REGISTER, Philadelphia, entitled "The Physical and Prosthetic Relationship in Restored Carious Teeth."

[This paper is printed in full at page 1303 of the present issue of the COSMOS.]

Discussion.

Dr. T. W. THOMAS, Wilkes-Barre. I did not expect to open the discussion of this paper, and not being a ready speaker I shall have little to say. I would heartily commend the essayist's paper, in which he goes back to the beginning and gives the history of the views prevalent in regard to the etiology of dental caries. I would also commend the essayist's statement about amalgam. There are a great many operators who maintain that gold is the only tooth-saver. I know just exactly how Dr. Register stands now; he thinks that there

are other gods than gold. I have nothing further to say, except again to register (no pun intended) my thanks to the essayist for coming here and giving us such a valuable paper.

Dr. H. S. SEIP, Allentown. Just one question in regard to one of Dr. Register's remarks. He refers to the fact that, with all our knowledge, we are still far from the solution of the problem of the cause of dental caries. I have just asked Dr. Roe whether there are any comparative records of the prevalence of caries among the wild animals and in mankind. Does not one of the principal causes of dental caries lie in the artificial manner of living which prevails in the human race. I wonder if the proportion of caries in wild animals comes anywhere near the large amount of dental disintegration prevalent in the human race?

Dr. C. S. VAN HORN, Bloomsburg. I did not hear all of Dr. Register's paper, owing to my duties as a member of the Committee on the President's Address.

There is a great deal of food for thought in his paper, which impressed me with the necessity of being eclectic. There is no one method, no one material which we can apply in all the teeth of all the people whom we are called upon to treat. We have a number of materials and methods and a number of patients with a number of different conditions to be met, and the man who is making a success of dentistry is the one who can select the material and the method best suited for the condition presented.

Our duty is to combat dental caries as we find it. If we can do this best with amalgam fillings, well and good; if we can do it best with gold fillings, porcelain, gold inlays, or some of the silicate cements, gutta-percha, or what not, all well and good. In proportion as a tooth needs saving—I would modify Dr. Flagg's statement—the gold inlay is the best method to use. The reason for this statement is that I have never yet seen an amalgam restoration stand up under the force of occlusion. Amalgam breaks off and chips away; the gold inlay will not, whenever it is necessary to protect a weak wall with a comparatively small bulk of filling material. I am not advocating the extensive use of the gold inlay or any other method or material, but it seems to me that rather in proportion as a tooth needs saving, the gold inlay is the best means to use in posterior teeth.

Dr. E. J. DONNEGAN, Scranton. Dr. Register mentions the fact that a great many people do not receive dental attention. It seems to me that, if they ever do receive dental attention it will be through the studies of such men as Dr. Register and their efforts to control dental caries.

I agree with the essayist that the alloy filling is saving more teeth than any other material. I do not agree with Dr. Van Horn that the gold inlay is the best filling method, because the majority of patients cannot afford it. The general run of practitioners must use that material which can be introduced in a minimum of time and which will serve the masses best. I agree with the statement made by Dr. Middaugh the other day, that in proportion as a tooth needs filling, the worst material is silicate cement, which, I think, is the most treacherous boomerang the profession has handled in a long while. I have seen my own fillings, and many others made by the hands of the best operators, but none of them are good. As Dr. Middaugh said, silicate cement is really a temporary filling material. We have been led astray by the very excellent appearance of these fillings when first inserted. One other difficulty with this material is that so many practitioners make silicate cement fillings and call them porcelain. At the present time I am not using porcelain a great deal, but occasionally I restore the incisal edge of a tooth with porcelain, and immediately the patient will say, "I do not want that; Dr. So-and-so used that, and it failed." It was silicate cement that had been used previously, and the impression was left with the patient that it was porcelain.

I would like to ask Dr. Register whether he builds his alloy fillings upon

a cement lining? I noticed that he recommended the use of gutta-percha. I have removed gutta-percha from teeth at different times, and have found that it has a slight odor. I would recommend in its place the use of a solution of rosin and chloroform. Lately one of the dental journals published an article by Dr. Callahan suggesting the use of rosin as a root-canal filling. I have been using this; Dr. Knox has employed it for fifteen or eighteen years. A saturated solution of rosin and chloroform I have found very useful for this work for many years.

I like to use cement as a cavity lining before introducing an amalgam filling. Of late years I have been using a jet black copper cement as a cavity lining, especially in children's teeth. While the cement is still soft, I pack the alloy on top of it.

As to gold fillings, I think one of the best filling materials at our command is gold inserted by pressure. It is less irritating to the soft tissues, and probably to the dentinal tubules of which Dr. Register has spoken.

I enjoyed the historical portion of Dr. Register's paper very much. It was news to me that the germ theory was known as far back as 1500 A.D.

Dr. R. H. RIETHMÜLLER, Philadelphia. I wish to commend most highly the essayist's treatment of the question of the etiology of dental caries. I was more than delighted to find that he is dissatisfied with the chemico-parasitic theory of dental caries, which for years, after it had been placed on a scientific basis by Miller, has occupied the attention of the dental profession, but has failed to solve the problem. Within recent years the opinion has been gaining ground that an entirely different line of research will have to be followed if we are to arrive at any definite conclusion. Work such as is being done by Pavlow, Pickerill, Kirk, Gies, and others will, I think, bring us nearer to a solution of the question of the etiology of dental caries, which, I believe, will in time be recognized as a disease of not only environmental but constitutional origin. This is proved by the fact that during certain periods and conditions of life, especially during pregnancy, we find increased susceptibility to caries. In cases of altered function or disease of the hypophysis, the thyroid and the parathyroid glands, caries has been noted to occur very promptly. This line of research, therefore, seems most promising, and will bring us a step nearer to the final solution of the problem.

The essayist recommends the use of amalgam alloy, which, in my opinion, has become more than ever a necessity since the oral hygiene movement has been started. What other dental material will solve so satisfactorily the great demands which are being made upon the oral hygiene worker? Owing to stimulus exerted by the efforts of the Research Committee of the National Dental Association, the question of amalgam alloys has been taken up in a scientific manner, and dental manufacturers have been straining every effort to produce better and more reliable alloys. It is to be hoped that every practitioner in his own way—the young men, though they have little experience, should derive enthusiasm and inspiration from such work as the essayist has presented—will strain every effort to add his mite to the research which is bound to bring about the solution of this problem of combating dental decay, the universal scourge.

There is no doubt whatever as to dental caries being a disease of civilization, and this fact in turn tends to prove that it is a constitutional derangement. It has been shown by Dr. Floxas of Constantinople that among the Mohammedans, whose religious creed forbids the use of alcohol, the percentage of caries is much smaller in abstainers than in those who occasionally indulge in alcohol. This observation, together with innumerable others, leaves no doubt that the continuous ingestion of toxins, such as alcohol, is responsible for the greater general distribution of caries in the human race. Corroborative evidence of caries being a disease of degeneracy has been furnished by Dr. Ottofy's investi-

gations among the Philippine Igorots, which proved that, since some of the primitive tribes in that country have used starchy foods and have become more civilized, dental caries is becoming more general among them. Similar observations have been made by Dr. Pickerill among the Maoris, and by other noted investigators among primitive tribes. Animals—and I am sorry that such a true lover of animals as Dr. Beck is not here to give his expert corroboration—become subject to caries as soon as they are taken away from their native haunts and fed on human food instead of their natural food. In menagerie beasts caries has been noted, frequently in association with general systemic derangement—which again proves that in the causation of caries there is more than one factor at work, a constitutional as well as an environmental.

Dr. W. J. Roe, of Philadelphia. I am glad to have the opportunity to say that in my opinion this is the best paper on the subject that I ever had the pleasure of listening to. There is nothing in it that I disagree with. I disagree with Dr. Van Horn that the question of etiology is of practically no importance. The best dental restorer is the operator who has the greatest amount of knowledge in respect to the etiology of the condition with which he is dealing. Like the essayist, I have been looking with horror upon the wholesale devitalization of teeth in the practice of crown and bridge work, and I constantly call the attention of dentists and of patients of the fact that every tooth devitalized for the sake of a crown or bridge is a menace to the health of the patient and a serious physical and dental loss because of the ultimate inevitable disintegration which is sure to occur. I therefore contend that the only normal, healthy, hygienic, safe mouth is that which does not contain a single devitalized tooth, and this paper is in line with that possibility in dentistry, viz, restoration that brings about physiological restoration in the tooth itself.

Dr. Van Horn. Dr. Roe does not disagree with me at all—in fact he agrees with me perfectly; he simply emphasizes what I have been trying to emphasize ever since I have been contributing to dental literature. What I wanted to say was that I personally could not consider that part of the paper because I had not heard it. Etiology of tooth decay or of disease is the first consideration always, and until we clearly know the cause of tooth decay, we are working empirically. I want to say emphatically that the cause of tooth decay is of paramount importance and the very first consideration, but that I could not consider it in my discussion, because I had missed that part of the paper in which this question was dealt with.

Dr. Register (closing the discussion). What I wished to impress particularly in reading this paper was the vital relations of the tooth tissues *per se*, also how these tissues are affected by the materials used for their artificial protection and restoration, after their natural protection, *i.e.* the enamel, has been destroyed by caries or by accident.

On the one hand, therapeutically speaking, these relations and influences, exerted and extended artificially, should present essential characteristics for protecting enamel and raw dentin, so that the vital relations within the tooth, through metabolism, may be normally maintained.

On the other hand, the materials used for restoring the lost tissues of the teeth should be of a constructive character so as to permit approximate restorations and contours being made to meet the wear and tear of function. While we realize that these conditions are difficult to overcome, yet we have materials which will meet the conditions sought, in a wonderfully successful way. The great good gotten by empirical methods shows that nature is ever ready to help herself.

From my own experience and deductions, and from clinical observations generally, associated with histological research and original investigations, I am convinced that the teeth, in their individuality, present the same physical conditions as other bodily structures do, and that treatment of the teeth for caries

must be made with the object in view of giving the internal parts of the tooth a chance to recuperate. In other words, while we restore the teeth mechanically, with a foreign substance, after they have been destroyed by caries or accident, the vital forces within the tooth itself should be met in a manner to permit the metabolism of its tissues to go on normally from within. At the same time, by this prosthetic protection are anticipated the influences of an external environment, which, as far as our present knowledge goes, is only one of the initial incentives of caries, namely bacteria.

As I have stated in my paper, the loss of the pulp cuts off all the vital relations of the tooth to the body. A limited amount of vitality, however, continues to be maintained by endosmotic action in the root portion of the tooth through its close relationship to its vascular envelope, which remains normal in the gomphosis joint.

Dr. Seip's question in regard to the influences of civilization upon the loss of the teeth is a difficult one to answer. The barbaric races, undoubtedly, suffered to a certain extent from caries of the teeth. Some recent investigations made by Dr. Ruffer upon Coptic bodies that were buried without being mummified, in upper Egypt, in a soil which preserved them in a wonderful manner for fourteen or fifteen hundred years, show that these people suffered with pyorrhea alveolaris and caries of the teeth, very much as people do in our own time.

In answer to Dr. Donnegan's inquiry I would say that, as a rule, I line all cavities with a gutta-percha collodion made from Para gutta-percha. The remarkable insolubility and tenacity of gutta-percha renders this material most suitable for protecting the fibril ends in the dentin, and thereby lessening thermal shock, and in these respects gutta-percha is unequalled by any other material that I know of.

MEMBER. How do you make that preparation?

Dr. REGISTER. It is made by dissolving gutta-percha in chloroform. There are two varieties, the white and the Para gutta-percha, which can be had in the form of the original pure gum. The gutta-percha that comes from Para is considered to be the best, and I use it for that reason. It is made into a thin solution that can be painted into the cavities with a small pellet of bibulous paper held in pliers. This solution is allowed to dry thoroughly; any excess extending over the cavity edges should be carefully wiped off with chloroform before insertion of the filling. This preparation when used as a lining in sensitive cavities will immediately relieve all external irritation. This is accomplished by the fibers in the dentin being protected by this thin film of gutta-percha in very much the same way as by its natural protection, the enamel. At my clinic tomorrow I will show my method of using the collodion. Also I will show how cavities can be shaped so that the enamel prisms will be preserved, as a rule, in their entire length, and if possible extending from the enamel cuticle to the dentin. To my mind this is one of the secrets of saving teeth. No matter what material is used for restoring a tooth, the protection extended by it to the enamel and dentin must be such as to permit the tooth to return to a condition of normality. This never can be done in devitalized teeth.

Dr. SEIP moved that a rising vote of thanks be given to Dr. Register for his excellent paper. (Motion carried.)

Dr. R. H. REITHMÜLLER, Philadelphia, described, with the aid of lantern slides, the "Methods of Local Infiltration and Conduction Anesthesia," as determined by the anatomic conditions of the maxillæ.

The meeting then adjourned until the afternoon session.

(To be continued.)

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PHILADELPHIA, DECEMBER 1914.

EDITORIAL DEPARTMENT.

THE ARMY DENTAL CORPS.

THE act of Congress of March 3, 1911, creating an Army Dental Corps establishes two grades in the dental corps of the United States army—a commissioned status of first lieutenant, and acting dental surgeons (contract dental surgeons), which grade applies to the state militia. The act of March 3, 1911, states that all commissioned men in the dental corps shall rank next below officers of the medical reserve corps. The act of Congress establishing a medical reserve corps U. S. army fixes their rank by stating that they (medical reserve corps men) shall rank below all first lieutenants of the United States army, consequently all commissioned dental surgeons of either the United States army or volunteers rank below all first lieutenants of other branches. As there is no medical reserve corps in the militia the practical injustice of this arrangement is shown by the fact that all second lieutenants of the army automatically jump all dental surgeons

commissioned as first lieutenants, no matter what length of service the dental surgeon may have.

The dental surgeon commissioned as first lieutenant who has served twenty years could be ranked out of his quarters by a second lieutenant who had just been promoted to be a first lieutenant; a medical man who has just been appointed to the medical corps without any service, and still worse, any medical reserve corps man whom the War department might order on temporary duty, even though for only a few weeks or days, when reporting to his station can rank the dental surgeon out of his quarters.

As it is now, dental surgeons of the army can never go higher than first lieutenant in rank, no matter what their length of service may be. The maximum pay is $2800, and this only after twenty years' service. The dental surgeon starts in as an acting dental surgeon at $1800, and may come up for examination for a commission after three years of service. If he passes his examination, he becomes a first lieutenant, with a salary of $2000, and after two years' service as such draws his first ten per cent. increase, making his salary $2200; and after ten years' service he draws $2400, after fifteen years' service $2600, after twenty years' service $2800, which latter is the maximum under the present limitation of his rank.

In the medical corps a doctor is appointed as first lieutenant, serves three years and is promoted to a captaincy, and from that grade through the grades of major, lieutenant-colonel, and colonel. He is promoted by seniority, *i.e.* his promotion is dependent upon the promotions, deaths, resignations, retirement (disability and age) of those ahead of him in rank.

Apart from the relative injustice of the workings of the act of Congress providing for the creation of a dental surgeons corps in the army, it is open to grave criticism from the point of view of efficiency of the corps itself. After a man is commissioned as a first lieutenant and dental surgeon there is no provision by which he can be made to keep up in his professional work. He may be negligent, careless, or inefficient, and the only way to discipline him is by court-martial, a method which ordinarily is used only as a last resort, whereas if the army dental corps had more grades the dead timber could be eliminated through the in-

strumentality of the promotion examinations as in other branches of the service. Moreover, the increased grades or ranks which carry with them increased pay would serve to attract a higher grade of applicants—even the brightest men in the profession.

We are well aware that there has existed a well-defined and justifiable opposition to the several steps in the plan by which creation of the corps of army dental surgeons has been made possible; eminently just opposition was raised in the early history of army and navy dental legislation toward the creation of a dental corps on the contract basis. Even recognizing its defects, we took the ground that the establishment of such a corps would furnish a basis of opportunity for the dental profession to practically demonstrate the utility of the service which it could render to those engaged in the defensive work of our government, a general recognition of which would in time render such service indispensable; and when such recognition was achieved, a dental surgeons corps upon a commissioned basis would be possible. The corps has continued to render admirable service, and the action of our government in creating the corps has served to attract the attention of other governments and has served also as a pattern upon which similar dental service among other nations might be established.

It is, however, important that the dental profession of America as a whole should recognize that much is yet to be accomplished before official recognition of the importance of dental service in the United States army and navy can be given to an extent and degree justly in accord with the importance of the service rendered.

We have endeavored to call attention to some of the deficiencies of the present arrangement, which should be remedied as rapidly as possible, not only for the immediate benefit of those now constituting the army dental surgeons corps, but for the credit of the dental profession itself. In this connection it should be remembered that it is a function or should be a function of the several state societies to see to it that good representative men are appointed upon the dental surgeons corps by the adjutants-general of the several states militia, and in those states in which dental surgeons have not been appointed, the attention of the adjutants-general of such states should be called to the law of March

3, 1911, which gives authority to form such a corps in the proportion of one dentist (acting dental surgeon) to each one thousand men. It is somewhat surprising that the most progressive states in military affairs and with the largest states militia—for example, New York, Pennsylvania, Ohio, Indiana, and Illinois—have not appointed dental surgeons.

Recognition of the service which dentistry can render to the government through the instrumentality of its corps of army and navy dental surgeons can only be achieved through the demonstrated efficiency of the service. It is not a question of sentiment, it is a question of practical utility, and governmental recognition must therefore be achieved gradually by the continued practical evidence of the efficiency of the dental surgeons corps in caring for the class of disabilities which it is within its province to treat.

An interesting example of the alertness of our government in the matter of securing knowledge of the most advanced ways and means for dealing with the disabilities of those employed in the army and navy service is furnished by the appended order of the Secretary of War, transmitted through the Adjutant-general, authorizing the investigation of the treatment of pyorrhea alveolaris by emetin hydrochlorid. It is reasonably certain that the government will respond to any proper demand for full recognition and rank of the dental surgeons corps wherever and whenever the argument of the utility and efficiency of dental service is clearly demonstrable:

WAR DEPARTMENT.

ADJUTANT-GENERAL'S OFFICE, WASHINGTON,
October 29, 1914.

From THE ADJUTANT-GENERAL OF THE ARMY.

To FIRST LIEUT. S. D. BOAK, DENTAL SURGEON (through the Superintendent, U. S. Military Academy, West Point, N. Y.)

Subject: Authority to visit Medical Department, University of Pennsylvania.

The Secretary of War authorizes you to proceed to Philadelphia, Pennsylvania, without expense to the Government, for the purpose of studying and observing the new emetin treatment for pyorrhea alveolaris, on November 5 and 6, 1914.

A. F. LADD, *Adjutant-general.*

Review of Current Dental Literature.

Conducted by RICHARD H. RIETHMÜLLER, Ph.D., D.D.S.

[*Journal of the Allied Dental Societies*, New York, March 1914.]

ROSIN SOLUTION FOR THE SEALING OF THE DENTINAL TUBULI AND AS AN ADJUVANT IN THE FILLING OF ROOT-CANALS. By Dr. J. R. Callahan.

Callahan recommends a thin solution of very light rosin, as prepared by Bernardel for the use of violinists, in chloroform, of the following formula: Rosin gr. xij, chloroform ℥iij. Its thinness permits this solution to penetrate into the dentinal tubuli and to permeate decalcified dentin, thus engulfing the micro-organisms and inhibiting their further activity. Rosin solution is also very valuable under large metallic fillings, as it neutralizes thermal shock, and may, in rare cases, be successfully used for pulp capping. It is in root-canal filling, however, that this solution is most valuable, in the opinion of the writer, who discusses at length the requirements which must be fulfilled by a reliable root-canal filling material. He attributes great merits to the paraffin root-canal filling, yet expresses some doubt in regard to the permanence of this material within the body. His technique of filling root-canals with rosin and gutta-percha he claims to be simple, easy, quick, and sure to seal all tubuli and foramina that are open. He demands that a root-canal should be given the general shape of the paper root-canal driers as furnished by dental dealers. In addition to this general form, the mouth of each canal should be made saucer-shaped, which will facilitate the placing of agents or instruments to or near the apical foramen. The canal is then thoroughly dehydrated with acetone, hot air, and a heated wire, which must, however, not be overheated so as to damage the root. The root-canal is then flooded with the rosin solution, which is pumped in with a wisp of cotton on a broach. When the canal is full of solution, a fine wire or broach is passed to the end of the canal in order to avoid any enclosure of air. A gutta-percha point that will reach to or near the end of the canal is introduced with fine foil pliers under frequent pumping motions, the cone advancing as it is being dissolved by the chloroform, the rosin sealing the tubuli and causing the gutta-percha to stick firmly to the canal walls. The writer avers that he succeeds in filling only those canals which are open and dry to the farthest extremity, and he aptly remarks that the probability of subsequent inflammatory conditions in all cases depends upon the ability of the operator to read the pathological signs of each individual case and his skill and delicacy of touch in the manipulation of the various agents used.

The advantages of the rosin solution and gutta-percha over chloro-percha are, chiefly, that the rosin solution enters deeply into the tubuli and foramina, that the rosin-solution causes the gutta-percha to adhere closely to the walls of the root-canal, and that the incorporation of rosin in the chloro-percha made freshly within the root-canal makes an unshrinkable and impervious mass about the gutta-percha cone.

In demonstration of the diffusibility of the rosin solution through the dentin, color photographs were taken of extracted teeth which had been treated, in the manner indicated, with rosin and chloroform that had been stained blue, and then bisected. In the color photograph affixed to the paper, the impregnation of the dentin with the stained rosin-chloroform—(not chloro-percha, as the legend claims, or may it not be merely stained chloroform?)—is clearly shown.

[*British Dental Journal*, London, July 1, 1914.]

BRIDGE WORK IN CONVERGING ABUTMENTS. By R. D. Gregg, L.D.S.

In cases of convergence of the abutments of a bridge, as, for instance from first molar to canine, the molar is fitted with a shell crown, and the canine is supplied with an inlay in a cavity cut in the disto-lingual surface, and a post extending into the root-canal and attached to this inlay. Since in such cases, however, the completed bridge would not go into place unless the post were almost entirely cut away, the writer suggests the following technique: The inlay cavity is prepared and a post of platinoid wire is drawn to the required gage by means of a drawplate, and a duplicate of this post is drawn in gold wire. The platinoid post is warmed, fixed into a piece of inlay wax of about the size of the cavity, and, after oiling the cavity and root-canal, the pin and wax are forced home. The wax inlay is shaped up, cooled, and removed by grasping the projecting part of the post. The inlay is then cast on to the wire, and left in hydrochloric acid for about twelve hours; the platinoid post is thus dissolved, leaving a hole into which the duplicate gold wire will fit exactly. On cementing the bridge, the inlay will slip into place easily, no matter how convergent or divergent the roots of the two abutments may be, and while the cement is still setting, the gold pin is forced home through the inlay and burnished down.

[It would be simpler to use a graphite post of suitable size when shaping and casting the inlay, thus doing away with the necessity of drawing and dissolving a platinoid post.]

[*La Stomatologia*, Milan, February 7, 1914.]

ERYTHROPHLEIN, A DENTINAL ANESTHETIC. EXPERIMENTAL AND CLINICAL RESEARCHES. By Professor Dr. G. Fasoli and Dr. A. Arlotta.

In the face of recent efforts to arrive at a reliable therapeutic agent for the desensitization of hypersensitive dentin, the present researches into the action of erythrophlein are very interesting. Erythrophlein was recommended by Dr. Audy and indorsed by the Odontological Congress of Grenoble in 1914. It is the alkaloid of an African plant, *erythrophlœum guinense*, which is used by the natives as an arrow poison, and is similar in action to digitalis, being an anesthetic, and highly irritating to the cornea. According to Dr. Audy, erythrophlein is especially indicated in hyperesthesia of the dentin; it is entirely innocuous, neither caustic nor vaso-constrictor, acts very rapidly, and the peridental inflammation sometimes following its application in older individuals quickly subsides without impairing the tooth. If applied in 50 per cent. solution in eugenol under gutta-percha, all sensitivity of the dentin disappears within from twenty-four to forty-eight hours.

Professor Fasoli has employed in his experiments Merck's erythrophleinum sulfuricum, with the following results: The application of small quantities in superficial cavities produces no results, even if left for one week. In deep cavities, the application of this alkaloid is followed by severe pain which lasts for forty-eight hours. After this period the highly inflamed pulp could be removed painlessly, only a minute portion at the apical foramen remaining sensitive. In experiments on dogs, canine teeth were opened into, and the drug was applied in the form of glycerin paste sealed in with cement. After killing the animals the teeth were fixed with formol, decalcified, and sections thereof prepared for microscopic examination, which showed hyperemia of the pulp, incipient necrosis, and liquefaction of the entire organ, which in dogs usually is very resistent.

From these findings Fasoli concludes that—(1) we have as yet no chemical or physical means for painlessly operating on hypersensitive dentin. (2) The most suitable means are at the present time dehydration of the field of operation, great sharpness of the instruments, brief application of pure nitric acid, hot or compressed air, and in refractory cases subgingival injection of novocain-suprarenin. (3) The clinical experiments of the joint authors show that all preparations which have a penetrating action and require an application of from one to several hours, are absolutely dangerous to the integrity of the pulp. (4) Erythrophlein, which has injudiciously been recommended by some dentists as a certain and harmless dentinal anesthetic, is to be banished from rational therapy, being a violent caustic, dangerous not only for the pulp but also for the peridental tissues.

[*Deutsche Zahnaerztliche Wochenschrift*, Berlin, March 7, 1914.]

DIFFERENCES IN THE DENTURES OF MEN AND WOMEN. By Zahnarzt Lincke, Liegnitz.

Recent investigations into the qualities of the teeth and jaws in the two sexes and at different ages have led to results interesting especially in regard to the development of the teeth, and their size and structure. Yet it is difficult to arrive at definite laws. Ellis claims that the teeth in women are of comparatively larger size than those of men, while the latter have a larger mandible than have females. An examination of 200 Manchester school children is said to have shown that development of the teeth in girls shows greater advancement than in boys. According to Schaafhausen, the central incisors in girls and women are comparatively larger than in boys and men of the same ages. Culippe maintains that the structure of teeth is stronger in men. Caries is said to occur with equal frequency in both sexes. Race and individuality surely will always have to be considered in this connection, and no general rules can be laid down, except perhaps in members of one and the same race. The more natural the mode of living of an individual the better the condition of the teeth, as is proved by semi- and uncivilized peoples. Even primitive races observe certain rules of oral hygiene and seem to appreciate the beauty of the teeth, though what may appear beautiful to one may be extremely ugly in another people's estimation. The coloring of teeth through the entire scale from yellow to black is considered beautiful by certain tribes, while in all civilized races white teeth are the exclusive standard of beauty.

The individual's general physical condition, nutrition and dental care are well-known factors which must be fully considered in attempts at statistics, and in comparisons of the dentures of the two sexes, lest otherwise false conclusions and grave errors be arrived at.

RÉSUMÉS OF PAPERS PRESENTED AT THE SIXTH INTERNATIONAL DENTAL CONGRESS,

London, Eng., August 3, 1914.

Section I.—*Dental Anatomy, Histology, and Physiology.*

THE SOFT FIBER OF TOMES A TUBULAR STRUCTURE. By Dr. C. F. Bödecker, Berlin.

1. The contents of the dentinal canaliculi, according to the views generally accepted, consist of a solid fiber as described by Charles Tomes, surrounded by a sheath (sheath of Neumann).

2. The author, however, claims that the fiber in the living dentin is not solid, but tubular in form. Neumann's sheath is coexistent with the tubes.

3. This tube, being a prolongation of the odontoblast, should be named odontoblastic tube or tubular process of the odontoblast. The name thus describes its form and origin.

4. The odontoblastic tube contains the nutritive fluid for the dentin and the enamel.

5. The contents of the odontoblastic tube, which in life are fluid, coagulate upon the death of the pulp. This explains why many microscopical slides of dentin show the odontoblastic tube as fibers.

6. If the fluid contents of the odontoblastic tube (coagulated by most fixing agents) are identical with the "soft fiber of Tomes," we are forced to conclude that a sheath inclosing the soft fiber is present inside of Neumann's sheath.

7. The walls of the cell (odontoblast) and those of the tube, as well as the contents of the cell and tube, are continuous.

8. The tubular processes of the odontoblasts are shown in photomicrographs.

9. The tubular process of the odontoblast carries the circulatory fluid to the dentin and enamel (afferent), whereas the space formed between Neumann's sheath and the walls of the tube transport the fluid back to the pulp (efferent). By this theory, Neumann's sheath for the first time receives a physiological importance.

SECTION II.—*Dental Pathology and Bacteriology.*

THE ETIOLOGY OF DENTAL CARIES. BY DR. LEO FLEISCHMANN, VIENNA.

The author's standpoint is contrary to the opinion of Miller, that caries constitutes a mere parasitic disease, the caries of the enamel and of the dentin being in their pathogeny and their progress an identical process. The author bases this opinion on histological demonstrations as proved by cross sections of carious enamel (Bödecker's method). Like Baumgärtner, he found that micro-organisms enter between the enamel rods, thus first reducing the interprismatic substance, rich in inorganic matter, while the prisms still remain intact.

By further investigations it was proved that the prisms themselves become permeated by micro-organisms, and that they finally decay to a shapeless mass.

One sees, therefore, exactly the same phases as in caries of the dentin, the interprismatic substance playing the part of the dentinal fibrils, and the prisms that of the dentin matrix.

The obsolete opinion that micro-organisms could only enter into some previously decalcified enamel is deemed by the author an *a priori* accepted but never proved supposition. Theoretically it may, of course, be possible that micro-organisms enter exposed organic substances. Such organic substances, in defectively calcified or decalcified condition, partly can lie openly in the enamel on the surface, as has been proved by different writers. That they occur at places of predilection (fissures, approximal surfaces, and at the bottom of a tooth) has only been recently shown by Gottlieb. The fact of the interprismatic substance decaying first cannot be explained by the action of acids, for we know that by the action of acid the decay begins in the prisms and is followed by that of the substance. This phenomenon can therefore be considered as being caused by bacteria.

This is the reason why the author pictures to himself the procedure of progressing caries in the following manner: The micro-organisms enter the organic constituents on the surface of the enamel, destroying the organic substance, and on this spot generating an acid, which in turn dissolves the calcium salts reached by it. The micro-organisms then enter the decalcified prisms and destroy them.

The question whether the carbohydrates of the food likewise have any influence in this matter, the author prefers to leave open.

Considering all these theories, the principal difference lies in the supposition that, according to the parasitic theory, the acid generates on the very spot—that is, in the tooth itself—and not outside of the tooth.

This parasitic theory of caries enables us to explain all the different phases of caries immunity far better than all other theories which assume the acid to be generated outside the tooth, thus substituting a biological possibility for a chemical reaction.

A chemical reaction *must* take place.

A biological phenomenon *may* take place.

[We regret to be able to publish the foregoing paper only in the author's own *résumé*, particularly for the reason that his theory unsupported by microscopic demonstration does not appear to be in harmony either with the findings of Miller or with the recognized appearances of carious enamel or dentin as recorded and demonstrated by competent observers since Miller, the general result of which has been to confirm the scientific soundness of Miller's findings and his chemico-parasitic theory of dental caries.]

SECTION III.—*Dental Surgery and Therapeutics.*

A SCIENTIFIC TREATMENT OF PULP, ROOT-CANALS, ETC. (WITH RADIOGRAPH LANTERN SLIDES.) BY M. L. RHEIN, M.D., D.D.S., NEW YORK, N. Y.

Bacteriologic research demonstrates that endocarditis and numerous other diseases of an infectious nature very frequently have their origin in the infected area produced locally by pulp remnants left in root-canals in which the pulps were to be removed. Any organic portion of the pulp, however minute in size, left in the root-canal or the organic matter of the inner periphery of a root-canal, has the possibility of becoming a focus of infection. When the pulp of a tooth is to be removed, it is imperative that no infected area be left, and that all possibility of reinfection of this area be eliminated.

All work must be done under strictly aseptic precautions. Every particle of organic matter must be removed. The writer emphasizes the value of sodium and potas-

sium for this purpose; complete sterilization of canal and electrolytic removal of any infected area in the periapical space, hermetic sealing of the root-canal with a non-irritating unchangeable substance, which, when possible, should be forced through the apical foramina so as to protect this entrance to the canal from any possible reinfection. All the steps of the operation must be radiographed in order to prove them properly done.

REPLANTATION OF TEETH IN SEVERE CASES OF PYORRHEA ALVEOLARIS. BY STEN HAGER, STOCKHOLM.

The method is that of the late Dr. Geo. Forssman. The way in which a replanted tooth can be made to adhere to the jawbone is resorption on the surface of the root and new growth of connective tissue and bone, but sometimes the entire root is destroyed, beginning at the apex. The root-apex of the extracted tooth is therefore replaced with lead after removing the pulp and filling the canal from this direction. All foreign substances on the root are removed, the periodontal membrane not being destroyed. The alveolus is made deep enough, and sprayed with an antiseptic. A retaining appliance made out of metal bands, fixed with cement, must remain for three months. The writer's first replantation was performed in 1909, with excellent results. Patients demonstrated before the Swedish Dental Society several times show that their replanted teeth were firmly fixed. This treatment is justified only in desperate cases. Most suitable for replantation are the six anterior teeth of the upper jaw.

SECTION IV.—*Dental Physics, Chemistry, Radiography, and Metallurgy.*

USE OF PLATINUM IN DENTISTRY. BY DR. BARRA.

Platinum crowns and bridges are considerably superior to gold, not only from the esthetic but also from the practical point of view.

Attention should be called to the use of amalgam fillings which do not affect platinum. Owing to the high fusing-point of platinum, the working of massive platinum bridges is somewhat more complicated than gold work.

THE HARDENING OF METALS. BY T. MARTIN LOWRY, D.SC., F.R.S.

Metals may be hardened either by mechanical or by thermal treatment. The former process is the more general, since nearly all metals are hardened by cold-working, *e.g.* by rolling, hammering, or wire-drawing. Two effects are produced: (1) Internal strains are set up in the metal (Heyn); (2) the crystals are broken down, a hard, glassy, amorphous form of the metal being produced wherever slipping takes place (Beilby). The effect of annealing is (1) to remove the internal strains; (2) to cause the amorphous films to crystallize; (3) to cause the crystals to grow at one another's expense, so that the coarsely crystalline structure of the original metal is finally restored.

Hardening by thermal treatment takes place when steels (of various compositions) are chilled, and also in the case of some other alloys, such as the aluminum bronzes. The hardening may be attributed to the fixation of a hard form of a polymorphous metal, but this is now held to be an inadequate explanation, and the hardness of chilled steel is ascribed, at least in part, to strains set up by the sudden chilling or by incipient recrystallization.

SECTION V.— *Dental Prosthesis.*

ARTICULATION AND ARTICULATORS. BY DR. J. H. PROTHERO, CHICAGO.

The objects of articulators.

Artificial dentures need not necessarily exactly imitate natural teeth, nor articulators natural movements.

Further study of the movements and mechanism of mastication is needed.

Much more study has been devoted to the movements of the condyles than to those of the teeth.

To get good artificial articulation requires:

(1) Suitably designed teeth.

(2) Means to ascertain the movements of the particular patient's jaw.

(3) An articulator that will make these movements and these only, when the dentures are firmly fixed, or that will make such movements as will be efficient and permissible when the dentures are lightly attached.

PERISCOPE.

Waterproofing Plaster Casts.—To render plaster casts washable, the following preparation and treatment will be found effective. The process consists of two distinct operations—first, in the application of a solution of borax and alum to harden the cast; second, in that of insoluble precipitates by which the minutest pores are filled up, rendering the surface hard. Salts of barium, calcium, and strontium are suitable mediums for obtaining insoluble precipitates without the formation of spots. A hot saturated solution of borax is spread over the cast any requisite number of times, and then in like manner hot barium hydrate is applied. Afterward the cast is washed in a hot solution of pure curd soap and rinsed in water. Waterproofing may also be attained by applying a solution of six parts of linseed oil, boiled with one-sixth of its weight of litharge, and adding one part of wax. This mixture is applied warm to the thoroughly clean and dry cast.—*Elliott's Quarterly.*

Avoiding Brittle Vulcanite Dentures.—Brittle vulcanite dentures are usually due to faulty vulcanizers, or to insufficient care being exercised in vulcanizing. For instance, if three flasks be placed in a vulcanizer in series, the rubber in the lowest flask, which stands in the water, will come out of the vulcanizer more or less brittle; the rubber in the middle flask will come out not so brittle as that in the lowest flask; while the rubber in the top flask will invariably come out properly vulcanized, and be beautifully strong and flexible. To get the best qualities out of dental rubbers, they must always be vulcanized in pure steam. In busy workshops it is very difficult to observe the best conditions for vulcanizing, owing to pressure of work. If only one flask at a time be put in the vulcanizer it should be kept out of the water by being placed on an iron flask stool or on one or two empty flasks. We make it a practice not to use free water in a vulcanizer, because we have always found, during the last fifty years, that the steam generated from a lump of wet plaster in addition to the plaster in the flask has given more uniform and better results than steam generated from free water. If wet plaster only is used for the generation of steam, the quantity required in two flasks will be found sufficient, but if only one flask is put in the vulcanizer a lump of wet plaster should be added.—*Ash's Monthly.*

Filling Children's Teeth.—In children, it is usually impossible to get sufficient retention to make an amalgam filling without causing needless discomfort and perhaps the loss of control of the child. In large cavities, if the overhanging enamel margins are cut away, the decay should simply be removed, great care being used not to disturb the portion of carious dentin just overlying the pulp. These cavities may be successfully and quickly filled with oxyphosphate of copper cement. Where amalgam cannot be used and cement is undesirable, the patient may be made comfortable with a temporary filling of gutta-percha. Much of the pain and discomfort these little patients suffer is due to the packing of food in the interproximal spaces. This is first noticed when the parent finds that the child is bolting its food rather than properly masticating it.

Great care should be exercised in restoring these contact points to normal condition, and in protecting the interproximal tissues from injury.

When two cavities approximate each other, the teeth may be made comfortable by bridging across the interproximal space with gutta-percha, providing a metal plate has been placed across the interproximal space, one end resting on the gingival wall of each cavity. A bit of gutta-percha is first placed on the under side of the metal plate to make a gutta-percha adaptation, then the rest of the filling is placed upon it.—J. F. STEPHAN, *Dental Review.*

Oral Manifestations of Lead Poisoning.—Lead poisoning manifests itself in the mouth by the presence of a bluish-black line in the edge of the gum at the cervical margins of the teeth. This is a very valuable sign of lead poisoning if not confused with conditions that resemble it. The black deposit is lead sulfid, and is distinguished from tartar by the fact that it cannot be scraped off. It is aggravated by the existence of gingivitis due to tartar, but may be found

also in a comparatively clean mouth. Lead poisoning also produces gastro-intestinal symptoms—colic and constipation; cerebral symptoms—convulsions; and nervous symptoms—wrist-drop and other paralyses. Besides this, the blood examination shows a secondary anemia, characterized by a diminution in the percentage of hemoglobin and the number of red cells, together with a peculiar condition of the red cells as seen in stained smears, known as stippling. The red cells take the usual pink stain, but instead of being homogeneous, many of them are dotted with fine dark blue granules. It is interesting to study the various sources from which lead gains entrance to the system. Plumbism is common in persons working at trades involving the use of lead compounds, particularly lead-smelters, makers of white lead for paint, potters, who use lead in glazing, storage-battery makers, and painters. Lead may also enter the system through drinking-water conveyed by lead pipes, through hair dyes, and drugs.—R. H. Ivy, *Dental Review.*

Caries of the Teeth and Tuberculous Infection.—In many cases of tuberculous cervical adenitis in children, commonly known as "scrofulous glands of the neck," there is no doubt whatever that the infection gains entrance through decayed teeth. I have noted particularly in a large percentage of these children extensive decay of the first permanent molar. Tubercle bacilli have been found in the carious teeth of such cases by some observers, thus establishing proof of the connection between the two lesions. Thus dental disease may be the origin, first of tuberculosis of the cervical lymphatics, and from that may lead to generalized tuberculosis. The chain of evidence has repeatedly been established to show that the tonsils (which may be regarded as part of the mouth) frequently afford entrance to tubercle bacilli which infect the cervical lymph nodes, and thence the general system. George B. Wood has published a valuable paper on this subject. These facts emphasize the futility of treating tuberculous lesions of the neck without first of all clearing up the original foci of infection within the mouth, whether they be diseased teeth or tonsils. The same remarks apply to acute infections of the cervical lymph glands, which are often dependent upon infection within the mouth, and to chronic sinuses on the face and neck. The latter frequently come from diseased teeth or roots, and may stubbornly resist all kinds of treatment for years, because the cause is not recognized, and removed. Occasionally a root causing the trouble may be invisible, being covered entirely by gum or bone, and may only be shown by the X ray.—R. H. Ivy, *Dental Review.*

Dental Caries in Soldiers.—*The Militaermedicinske Selskat* in Norway undertook the investigation of the teeth of adults liable for military service in 1907 and 1908. Bjarne Arentz has analysed the results of this investigation, which was conducted on the same principles as those adopted by Dr. Loos, who concluded that a definite relation exists between the body weight and the condition of the teeth. Dr. Arentz classifies his material thus: (1) Good teeth, with four or fewer teeth diseased; (2) fairly good teeth, with five to nine teeth diseased; (3) bad teeth, with ten to fourteen teeth diseased; (4) very bad teeth, with fifteen teeth or more diseased. Over 12,000 forms were returned filled up, but only 8512 were satisfactory. As, however, only about 15,000 men are examined yearly for military service in Norway, the conclusions drawn from the satisfactory forms were considered to be applicable to all the young healthy adults in the country. Only 464, or 5.4 per cent., had perfectly healthly teeth. A comparison between country and town was strikingly in favor of the former. Only 4.6 per cent. of town dwellers were included in class 1, while over 50 per cent. were included in class 4. Of recruits from the country, from 12 to 45.2 per cent. were included in class 1, according to the various districts they came from. Artificial teeth were much more often found among town dwellers than country dwellers, whose teeth were seldom affected by rickets. In a table showing the relation between dental caries and occupation, fishermen rank highest, being represented by 51 per cent. in class 1 and only 6.8 per cent. in class 4. Persons engaged in farm work are considerably better off than other laborers; the factory hand shows many carious teeth. Tradesmen, clerks, and students have, as a rule, bad teeth. School teachers, shoemakers, and tailors usually have good teeth. As a class, bakers and millers have bad teeth. Summarizing his observations, the author concludes that dental caries is a widespread disease, worst in large towns, and least prevalent in outlying country districts practically cut off from civilization. No difference could be found in the teeth of the men accepted or refused for military service, but occupation influences appreciably the incidence of dental caries.—*Norsk Tidskrift for Militaermedicin* per *British Dental Journal.*

OBITUARY.

DR. FRANK H. WHITE.

DIED, suddenly, October 5, 1914, while on vacation, FRANK H. WHITE, D.D.S., of 175 West 81st st., New York City.

Dr. White was a graduate of the New York Dental College, and he had been in active practice in New York City for over thirty-five years. His father, Thomas R. White, was for many years in charge of the S. S. White Company's dental depot at Broadway and Ninth st., and he grew up in an atmosphere which encouraged interest and good workmanship.

He was, in fact, a finished, painstaking, and conscientious worker, with a peculiar genius for his profession, embracing a love of medicine and an unusually light, skilful touch, which gave him rare ability in handling delicate cases. His fine work, combined with a sympathetic nature and cheerful personality, endeared him to many patients.

"IN MEMORIAM" RESOLUTIONS.

Dr. M. Whillden Foster.

THE Maryland State Dental Association, by its board of governors, adopted the following preamble and resolutions, as prepared by the committee appointed for the purpose of formulating an expression of the sentiments of the association upon the decease of their esteemed follow-member, Dr. M. Whillden Foster:

Whereas, Almighty God in his infinite wisdom has seen fit to remove from the sphere of his earthly labors our esteemed colleague DR. M. WHILLDEN FOSTER; and

Whereas, the Maryland State Dental Association, of which he was an honored member, recognizing his worth as a practitioner and a teacher of exceptional ability and high professional standards, deems it fitting to record its sense of sorrow at his demise and to cherish the remembrance of his life-work as one worthy of emulation; therefore be it

RESOLVED, That the board of governors of the Maryland State Dental Association in council assembled extends to the bereaved family of the deceased its most sincere sympathy in their time of sorrow; and further be it

RESOLVED, That these resolutions be spread upon the minutes of the association and a copy forwarded to the dental journals for publication.

F. F. DREW,
B. M. HOPKINSON,
B. H. SMITH, JR.,
Committee.

Dr. F. J. S. Gorgas.

THE following preamble and resolution of regret concerning the decease of Dr. F. J. S. Gorgas were passed at a recent meeting of the American Academy of Dental Science, Boston, Mass:

Whereas, Dr. FERDINAND J. S. GORGAS, A.B., A.M., D.D.S., M.D., an honorary fellow of the American Academy of Dental Science, died in Baltimore, Md., April 8, 1914, in the eightieth year of his life. In his profession he was known and honored as one of the most notable men of his time, both as author and educator. He received the degrees of A.B. and A.M. from Dickinson College, and his dental degree in 1854 from Baltimore Dental College, where he taught, as dean and professor, from 1867 until 1882. He received his medical degree in 1863, from the University of Maryland, in which he was dean and professor from 1882 until 1911, having held the chairs of prosthetic dentistry, oral surgery, and dental medicine. He was editor of the *American Journal of Dental Surgery,* of "Harris' Principles and Practice of Dentistry," and of "Harris' Dental Dictionary." He was also author of a work on "Dental Medicine," and of "Questions and Answers for Dental Students." He was a member of the Maryland State Dental Association, and an honorary fellow of many societies.

Professor Gorgas was an enthusiastic teacher, ever eager to raise the ethical and educational standard of his profession. He is survived by his wife and two sons—Dr. L. D.

Gorgas of Chicago, Ill., and Dr. H. F. Gorgas of Baltimore, Md. Therefore be it

RESOLVED: That in the death of Professor Gorgas the Academy has lost one of its most valued fellows, whose colleagues, recognizing his great educational power, gave to him the many important positions which he held with such marked ability in the institutions he so faithfully served.

Respectfully submitted,

ROBERT R. ANDREWS,
FORREST G. EDDY,
EDWARD C. BRIGGS,
Committee.

SOCIETY NOTES AND ANNOUNCEMENTS.

PANAMA-PACIFIC DENTAL CONGRESS.

SAN FRANCISCO, the city by the Golden Gate, the city of romance and adventure, the pride of the pioneers and the inspiration of artists and poets, musicians and writers, for more than half a century has held, for one reason or another, the attention of the world. Her history, her commerce, her position on the greatest harbor of the western hemisphere, her recovery from the greatest disaster which history records, have kept her first and foremost of all the cities of the West.

Proud of her history, of her vitality and strength, she now invites the world to celebrate with her in 1915 the completion of the Panama Canal, the dream for centuries of the world's engineers, realized at last—the masterpiece of human accomplishment in overcoming nature's barriers to the development of trade, travel, and commerce; and she has prepared, for the entertainment, education, and pleasure of her guests, an Exposition which in beauty of architecture, location, and color, will stand for years the model for similar undertakings now unthought-of but yet to be developed by the genius of mankind.

The attention of the world is centered on this event, and here the educators, scientists, and promoters of every form of progress will gather to teach and learn the things that tend to the betterment of humanity. Not to be outdone by any trade or profession, and fully realizing the magnitude and importance of its task, the dental profession of the Pacific Coast has prepared a congress, the Panama-Pacific Dental Congress, to be a part of the great educational undertakings of the Exposition, and invites the dental profession of the world to come and participate in its program, its pleasures and its profits.

No one can afford to miss this opportunity to attend the greatest of the world's expositions and the greatest of our professional congresses. No expense or labor, thought, or care, is being spared to make the Panama-Pacific Dental Congress mean for dentistry what the Exposition means to all the varied industries and interests of the world.

The plans of the congress are so far advanced that its success is more than assured. Its program is rapidly acquiring contributions from the leaders in every branch of dental science and art; its exhibits will embrace all that is best in dental commerce and education, and the entire congress will afford an opportunity for the practical acquisition of a vast fund of useful professional information.

Every dentist on earth who cares for his own advancement, or the welfare of his patients or profession, should at once apply to the executive committee of his country or state for membership in the congress, and arrange to be present at its opening ceremonies in San Francisco, California, August 30, 1915.

Panama-Pacific Dental Congress Committee of Organization. ARTHUR M. FLOOD, *Sec'y.*

ACADEMY OF STOMATOLOGY OF PHILADELPHIA.

THE annual meeting of the Academy of Stomatology will be held at the College of Physicians on December 22, 1914, at 8 P.M.

After the election of officers Dr. Otto Inglis will present a series of short papers on "Incidents of Office Practice."

DUDLEY GUILFORD, *Sec'y.*

DENTISTS' MUTUAL PROTECTIVE ALLIANCE.

We have received for publication the following notice:

Dentists' Mutual Protective Alliance.

The recent decision by Judge Kenesaw Landis, in the Northern district of Illinois, denying the motion of attorneys for Taggart for a preliminary injunction against the officers and members of the Dentists' Mutual Protective Alliance, marks the first skirmish in a new battle. The above is an organization recently formed in the state of Illinois for the purpose of testing the validity of all process patents relating to dentistry, and, though only a few weeks old, it boasts a membership of over four hundred.

Those who follow the progress of the Taggart process litigation will recall that in the Taggart vs. Boynton case the District court of appeals in Washington decided unanimously against the validity of the patent. However, in the case of Taggart vs. Moll, Judge Landis, of the Ninth federal district, decided in favor of Taggart, thereby reestablishing the validity of the patent. In the face of these two conflicting decisions there is much speculation as to the results, and the case will therefore be watched with keen interest by all members of the profession.

Dr. J. Clinton Grant, *Cor. Sec'y.*

Dentists' Mutual Protective Alliance,
1118 Republic Bldg., Chicago, Ill.

SECOND DISTRICT (N. Y.) DENTAL SOCIETY.

Resolutions of Sympathy with European Confrères.

Whereas, the members of the Second District Dental Society of the State of New York have learned with deep concern of the distress and hardships which have been brought to our *confrères* because of the European war; therefore be it

Resolved, That this society expresses its deepest sympathy for all members of the dental profession affected by the war, regardless of nationality; and be it further

Resolved, That this society will gladly cooperate in any movement which will in any way alleviate the distress or difficulties of any of those, whom we look upon solely as brother workers in a common cause; and be it further

Resolved, That copies of these resolutions be sent to the dental magazines and the Associated Press, with the request that they be published.

AMERICAN INSTITUTE OF DENTAL TEACHERS.

The annual meeting of the American Institute of Dental Teachers will be held at Ann Arbor, Mich., January 28, 29, and 30, 1915.

There will be a number of interesting papers, reports, and discussions by prominent dental educators. All dental teachers are cordially invited to be present.

J. F. Biddle, *Sec'y,*
517 Arch st., N. S. Pittsburgh, Pa.

CHICAGO DENTAL SOCIETY.

The annual clinic of the Chicago Dental Society will be held in the Hotel La Salle, January 29 and 30, 1915.

The officers and committees are planning a program for this meeting, which they feel sure will be of interest to every dental practitioner who can arrange to be in Chicago at this time.

T. L. Grisamore, *President,*
P. B. D. Idler, *Sec'y.*

OHIO STATE DENTAL SOCIETY.

The forty-ninth annual meeting will be held in Memorial Hall, Columbus, December 1, 2, and 3, 1914. The entire state is now organized into components, and a very large attendance is anticipated.

Papers will be read by—

Dr. Wm. A. Giffen of Detroit, Mich., on "Technic for Taking Impressions and Making Models for Constructing Artificial Dentures," giving demonstrations with moving pictures.

Dr. H. W. MacMillan of Cincinnati, on "Diagnosis and Treatment of Trifacial Neuralgia."

Dr. W. W. Curtiss of Greenfield, Ohio, on "Conservation *vs.* Radicalism."

Dr. J. R. Callahan of Cincinnati, "A Lantern Lecture on the Use of Rosin in Operative Dentistry."

A selected list of progressive clinics will be given on Wednesday forenoon, and general clinics on Thursday forenoon.

One evening will be given to a Health Conservation Conference, to be participated in by all professions and interests devoted to the furtherance of human health and welfare.

A cordial invitation is extended to all society members from other states.

F. R. Chapman, *Sec'y.*

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties will hold its meeting on January 26 and 27, 1915, at Ann Arbor, Mich. Headquarters, Allen Hotel.

This meeting will precede the Teachers' Association meeting, which will be held January 28th to 30th. Besides the regular business there will be several papers of interest to educators read before the association.

The Executive Committee meets at nine o'clock, on Tuesday, January 26th. Regular session will open at ten.

B. Holly Smith,
Ch'mn Executive Committee,
Chas. C. Allen, *Sec'y.*

KINGS COUNTY (N. Y.) DENTAL SOCIETY.

On Thursday evening, December 10, 1914, Dr. Weston A. Price will give us an illustrated talk on "Oral Sepsis and Systemic Infections in the Light of Recent Researches." Dentists in New Jersey, New York and Connecticut, particularly, near enough to avail themselves of this opportunity, are very cordially invited. Make this a very hearty welcome to Dr. Price, who is doing so much for all of us. The meeting will be held in the Masonic Temple, Lafayette ave. and Clearmont ave., Brooklyn, at 8.30 P.M.

Alonzo M. Nodine, *Sec'y.*

CALIFORNIA BOARD OF EXAMINERS.

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practice dentistry will be held in the city of San Francisco, beginning on December 7, 1914, at 10 A.M.

Applicants for examination will file their applications with the board on the morning of December 7th. Each application must be accompanied by the fee of twenty-five dollars and the necessary credentials—diploma or license from other states—together with a recent unmounted photograph of the applicant.

For further particulars address

C. A. Herrick, *Sec'y,*
133 Geary st., San Francisco.

SOUTH DAKOTA BOARD OF EXAMINERS.

The South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., January 19, 1915, at 9 A.M. sharp, continuing three days. All applications for examination can be made with the secretary on January 18th, at the above address. Fee $25.00.

Aris L. Revell, *Sec'y,*
Lead, South Dakota.

BOARD OF EXAMINERS FOR PHILIPPINE ISLANDS.

The next regular meeting of the Board of Dental Examiners for the Philippine Islands to examine applicants for license to practice dentistry in the Philippines will be held in Manila, January 5, 1915. Only those who have diplomas from reputable and legally incorporated dental colleges are eligible to examination.

Any further information can be obtained by addressing

Louis Ottofy, *Sec'y,*
Manila, P. I.

TEXAS BOARD OF EXAMINERS.

The next regular meeting of the Texas State Board of Dental Examiners will be held in Cathedral Hall, Galveston, Texas, beginning Monday morning, December 14, 1914, at 9 o'clock. No interchange of licenses with other states.

Applications, accompanied by the fee of $25, should be in the hands of the secretary not later than December 10th. For official application blank, or for further particulars, address

C. M. McCauley, *Sec'y,*
434 Wilson Bldg., Dallas, Texas.

WISCONSIN BOARD OF EXAMINERS.

The Wisconsin State Board of Dental Examiners will convene in Milwaukee, at Marquette University, on December 14, 1914, at 10 A.M., for examination of applicants to practice in Wisconsin.

High-school diploma, application, and $25 fee to be filed with the secretary ten days prior to above date. Dental diploma to be presented in advance of the examination.

Junior dental students presenting a clear card for two years' unconditioned work from a reputable dental college and filing a high-school diploma or its full equivalent will be permitted to participate in the theory examination in the following six major subjects: Anatomy, chemistry, physiology, bacteriology, histology, and materia medica. The grades made in these subjects will be credited at subsequent examinations. Special application blanks for this examination and $10 fee, together with high-school credits, to be filed ten days in advance.

S. H. Chase, *President*,
W. T. Hardy, *Sec'y*,
1404 Majestic Bldg., Milwaukee, Wis.

OKLAHOMA BOARD OF EXAMINERS.

The Oklahoma State Board of Dental Examiners will hold its regular meeting at Muskogee, Okla., commencing December 7, 1914, at 9 A.M., for the purpose of examining applicants for license to practice dentistry in Oklahoma.

Each applicant must present his or her diploma from a reputable dental college of good standing, of which the board shall be the judge.

The written examination will be upon subjects taught in our reputable dental colleges. Operative and mechanical dentistry will also be required, and applicants should come prepared with engines, instruments, and material for doing such work. Our law makes no provision for temporary licenses.

Applications should be filed at least ten days prior to date set for examination. Address

E. E. Heflin, *Sec'y*,
200½ W. Main st., Oklahoma City, Okla.

PENNSYLVANIA BOARD OF EXAMINERS.

The next regular examination of the Pennsylvania Board of Dental Examiners will be held in Musical Fund Hall, 808 Locust st., Philadelphia, and the University of Pittsburgh, Pittsburgh, on Wednesday, Thursday, Friday, and Saturday, December 9, 10, 11, and 12, 1914. Application blanks can be secured from the Department of Public Instruction, Harrisburg. For further information address the secretary.

The Dental Council of Pennsylvania will require that students beginning the study of dentistry in the autumn of 1915 and desiring to come before the board in this state will have to have the entrance requirement of four years high-school diploma, or its equivalent, at the time of matriculation.

Alexander H. Reynolds, *Sec'y*,
4630 Chester ave., Philadelphia.

NEVADA BOARD OF EXAMINERS.

The next meeting of the Dental Board of Examiners of Nevada for the purpose of examining applicants for a license to practice dentistry will be held in the State Capitol building, in Carson City, commencing December 19, 1914. Each application must be filed with the secretary five days before the board meets, and be accompanied by the fee of twenty-five dollars, together with necessary credentials, diploma, or license.

Wm. H. Cavell, *Sec'y*,
Carson City, Nev.

NEW JERSEY BOARD OF EXAMINERS.

The New Jersey State Board of Dental Examiners will hold their regular semi-annual business meeting and examination in the Assembly chamber of the State-house, Trenton, N. J., on December 7, 8, and 9, 1914.

License fee $25. No interchange of license. Practical tests required. Gold filling in an approximal surface of a tooth, also a bridge consisting of three or more teeth, exclusive of abutments, and one Richmond crown—gold metal—mounted and articulated. Applications must be filed *complete* with the

secretary ten days before the date of the examination.

Attention is directed to the following requirement: "All applicants for a license to practice dentistry in New Jersey shall present to said board a certificate from the superintendent of public instruction showing that before entering a dental college he or she had obtained an academic education, consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof."

In accordance with the above ordinance, the secretary will issue application blanks to applicants only upon presentation of the required certificate from the superintendent of public instruction, Trenton, N. J.

For further particulars apply to

ALPHONSO IRWIN, *Sec'y*,
425 Cooper st., Camden, N. J.

MONTANA BOARD OF EXAMINERS.

THE Montana State Board will hold a session for the examination of candidates on the second Monday in January 1915.

G. A. CHEVIGNY, *Sec'y*,
Butte, Mont.

DISTRICT OF COLUMBIA BOARD OF EXAMINERS.

THE next examination of applicants for license to practice dentistry in the District of Columbia will be held at the George Washington University, January 4, 5, 6, and 7, 1915. Applications should be in the hands of the secretary two weeks before the date of examination. Fee $10.

STARR PARSONS, *Sec'y*,
1309 L st., N. W., Washington, D. C.

UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER 1914.

October 6.

No. 1,112,561, to EDWIN H. RODELL. Tooth-brush.

No. 1,112,697, to FRIEDRICH HEYDE. Artificial tooth.

No. 1,112,847, to HEINRICH SCHWEITZER. Centered mold for dental castings.

No. 1,113,054, to FRANCIS W. SADLER. Soluble tooth-brush.

No. 1,113,090, to ROSCOE C. BELL. Sanitary dental impression tray.

No. 46,510, to EDWIN G. OVER. Design for sanitary tooth-cleaner.

October 13.

No. 1,113.325, to ERNEST DEW. R. GARDEN. Implement for forming metal backings for artificial teeth.

No. 1,113,752, to ALEXANDER CAMPBELL. Dental handpiece.

October 20.

No. 1,114,291, to RAY D. ROBINSON. Orthodontic appliance.

No. 1,114,624, to ADOLPHUS G. MEIER. Tooth-straightening device.

No. 1,114,646, to LAJOS PAP. Tooth-brush.

October 27.

No. 1,115,061, to JOHN B. FOSTER. Tooth-brush holder.

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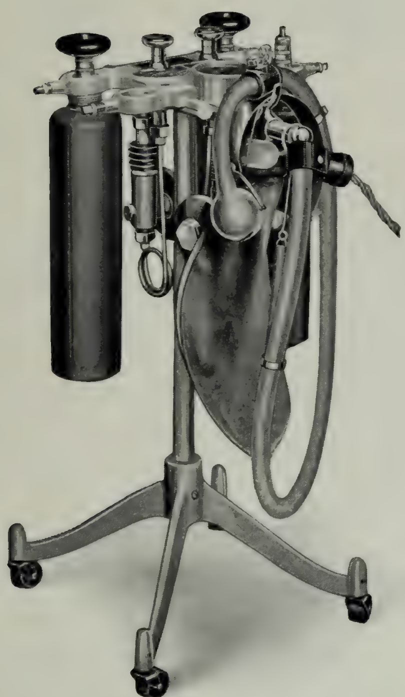
1914.

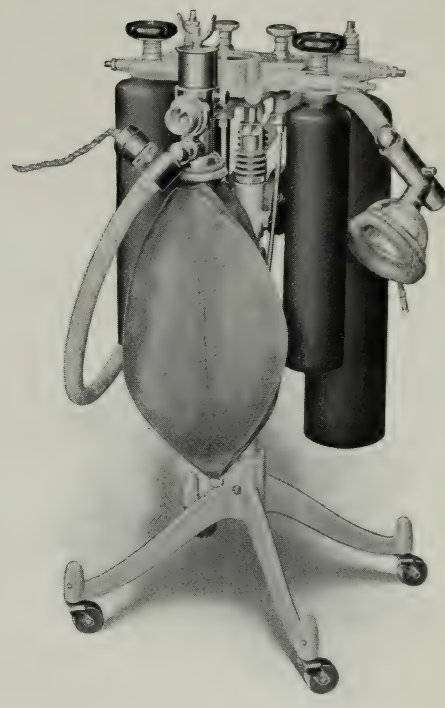
First pages of monthly issues: JANUARY, 1. FEBRUARY, 137. MARCH, 261. APRIL, 409. MAY, 533. JUNE, 665. JULY, 789. AUGUST, 917. SEPTEMBER, 1017. OCTOBER, 1109. NOVEMBER, 1205. DECEMBER, 1293.

NON-ASPHYXIAL ANESTHESIA FOR ALL USES

The S. S. White Nitrous Oxid and Oxygen Apparatus No. 3



The S. S. White Nitrous Oxid and Oxygen Apparatus No. 3, equipped with Nasal Inhaler No. 6, with two gas cylinders in place. Will take either 100- or 250-gallon cylinders of Nitrous Oxid and 40- or 75-gallon cylinders of Oxygen.



The S. S. White Nitrous Oxid and Oxygen Apparatus No. 3, equipped with Surgical Inhaler No. 7, and Ether Attachment, with full equipment of four gas cylinders. Will take either 100- or 250-gallon cylinders of Nitrous Oxid and 40- or 75-gallon cylinders of Oxygen.

Every phase of nitrous-oxid anesthesia, from the initial analgesic stage to the deepest narcosis, is available with the **S. S. White Nitrous Oxid and Oxygen Apparatus No. 3.**

By a simple change of attachments and inhaler, it becomes a dependable apparatus for all operations of the dentist from the analgesia required in excavating to the deep narcosis needed for extraction or oral surgery; or a complete surgical apparatus, with or without the nitrous-oxid-oxygen-ether sequence, for hospital or private practice wherewith profound non-asphyxial anesthesia can be induced and maintained for any length of time.

THE S. S. WHITE DENTAL MANUFACTURING CO.

"THE NEXT GREAT STEP"

Forsyth Dental Infirmary for Children Formally Opened

THE Forsyth Dental Infirmary for Children, the first institution in the world adequately equipped to grapple in a large way with the problem of caring free for the teeth of the young is a fixed fact. The dedicatory ceremonies were held November 24, 1914.

Its home is an imposing structure of classic beauty, built of white Vermont marble, on the most approved sanitary principles, and is located on the Fenway, facing Fenway Park, Boston, easy of access from all parts of the city.

In perfect harmony with the beautiful building is the splendid equipment, mostly of special designs, for which the trustees enlisted the services of the S. S. White Dental Manufacturing Co., to assure the most intelligent co-operation and chaste, enduring results. Of our work the president of the board of trustees writes: "The Chairs are a masterpiece. Of that there is not the slightest doubt. All those who have had the privilege of inspecting them are loud in their praise of the excellent workmanship that they portray which, naturally, is most gratifying to the trustees of the institution."

The chair referred to, which we call the Forsyth Chair Combination, is shown on the opposite page. The foundation of the combination is the S. S. White Diamond Chair, made smaller than the regular size, with a special head-rest and an auxiliary foot-rest adapting the Chair for very small children. Attached to the side of the base is a pedestal supporting two columns. One of these carries the S. S. White Spiral Flush Spittoon No. 6 with its equipment, the other the S. S. White Electric Engine, a glass bracket table, a detachable electric light, and an attachment for compressed air. The electrical resistance is located in the pedestal, and a hook is provided at the bottom of the chair back upon which the foot controller can be hung while the floor is being cleaned.

By a set of electric signals in the column supporting the engine, the operator can be notified that a patient is waiting for him; and he can signal back to the office when he is ready for the patient.

The Spittoon is equipped with glass bowl, and with an ingenious rinsing jet in place of the tumbler-holder; the saliva ejector and syringe are attached by slip-joints for ready removal for sterilizing. It is supplied with cold and tepid water, and with traps for ventilating and cleaning.

There are sixty-eight of these S. S. White chair combinations, finished in white enamel and numbered as shown in the illustration. Besides, there are pedestal cabinets, nitrous oxid and oxygen apparatuses, and a surgical engine of special design, all in the white enamel, a complete outfit of instruments and appliances of special designs, with hundreds of black-japanned aluminum instrument trays, etc.

Magnificently housed, perfectly equipped and munificently endowed, the Forsyth Dental Infirmary for Children starts upon its great mission under the happiest auspices. That it will do a great work in the eradication of dental diseases and thus vastly forward the development of a better race of men and women is not to be doubted. It may well be the beginning of "the next great step in preventive medicine."

THE S. S. WHITE DENTAL MANUFACTURING CO.

S. S. White Mold Guide of Plain Vulcanite Teeth

The Mold Guide here shown facilitates the selection of the size and form of Plain Vulcanite Teeth, just as the Shade Guide simplified the color question.

The **S. S. White Plain Vulcanite Mold Guide** contains sample teeth of 40 x 6 upper front molds, 16 x 6 lower fronts, 6 x 16 diatoric upper and lower backs matched, each tooth numbered clearly and permanently. These 432 teeth include appropriate matchings for every mold shown, embracing all those regularly assembled as "Combination Sets" (indicated by asterisk) and the most used forms for partial cases.

No mold is duplicated, and extremes of form and size are omitted, the object being to make the selection thoroughly practical. All the samples are of one shade, so that the question of color shall not hamper the selection of form. When size and form have been determined, the shade is chosen by means of the Shade Guide which is included in the outfit. A Shade Directory, showing the nearest match on our Shade Guide to the colors of other guides, is also supplied.

With this outfit the dentist is prepared to decide positively upon both form and shade at the chair by actual comparison in the mouth of the patient, and thus to make a definite order of just what he wants.

The S. S. White Mold Guide for Plain Vulcanite Teeth, including Shade=Guide and Shade Directory, the whole inclosed in black pantasote=covered case with nickel=plated trimmings. $10.00.

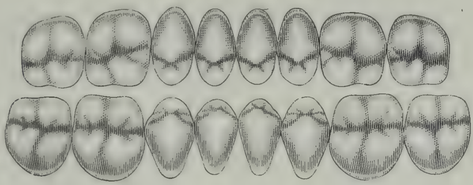
THE S. S. WHITE DENTAL MANUFACTURING CO.

BICUSPIDS AND MOLARS

For Cross-Biting Edentulous Jaws

One of the most difficult problems that confront the prosthetic dentist is the making of efficient full upper and lower dentures for patients whose jaws have been edentulous for a term of years. The difficulty is caused by the unequal absorption of the alveolar process in the maxillary and the mandible. So much greater is this absorption in the former that in extreme cases, the distance across the model of the mandible from ridge to ridge will greatly exceed that of the maxillary. Manifestly, under such conditions, porcelain teeth, as ordinarily matched up, can be mounted so as to articulate properly only by putting the upper bicuspids and molars outside or the lowers inside the ridges (see Fig. 1). This necessarily causes a loss of stability, sufficient in some instances to split the plates, to say nothing of the encroachment upon the space needed by the tongue.

30



An expedient to overcome this difficulty is to reverse the bicuspids and molars,—mount the lowers on the upper plate, the uppers on the lower, crossing them over, left lowers as right uppers and *vice-versa*. Hence the term, "crossing the bite." But this necessitates a lot of grinding; and because of the difficulties in securing satisfactory results, many edentulous patients are denied the comfort of artificial dentures.

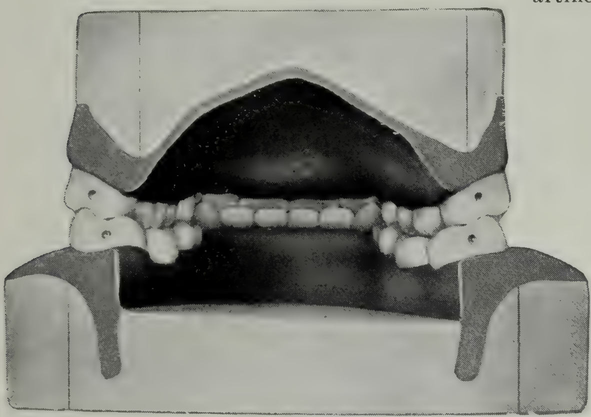


Fig. 1

The mold of bicuspids and molars illustrated has been specially carved to put into the hands of dentists the means for making the cross-bite articulation of bicuspids and molars demanded in the class of cases we have been considering.

They are so formed that the bite "crosses" in the region of the second bicuspids, so that the molars of the lower denture articulate buccally to those of the upper. (Fig. 2.) You thus get precisely the result attained by the expedient mentioned in a previous paragraph, but naturally and with a tithe of the labor.

For, the teeth are of our new Natural Form patterns, are properly proportioned, with cusps having the correct relations to assure easy mounting and correct articulation with little or no grinding. Observe in the illustration (Fig. 2) that the teeth bear upon the deepest part of the ridges, thus assuring stability, that there is room for the unrestricted movements of the tongue, and that the masticating surfaces are ample.

Mounted on the plain hinge articulator they afford the patient a larger, efficient masticating surface; if the anatomical articulator is used, the balanced support is attained,—the greatest desideratum in an artificial denture.

Made only in one Diatoric Mold of average size (Mold 30) which matches up with many of our Plain Vulcanite fronts.

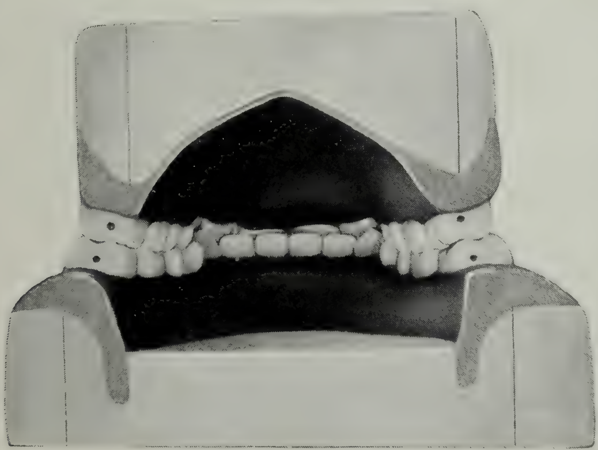
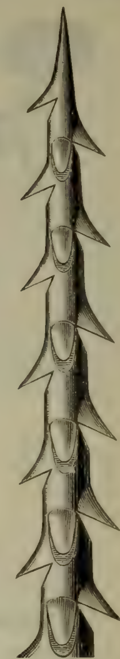


Fig. 2

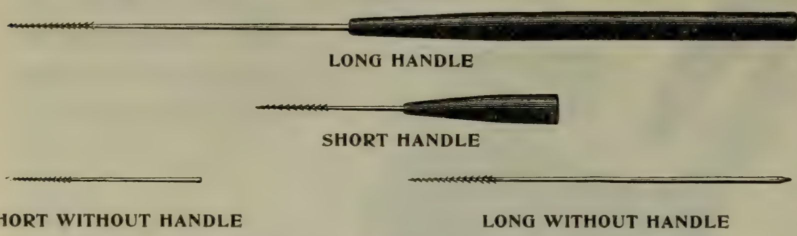
Price, set of 16 . . $0.80

THE S. S. WHITE DENTAL MANUFACTURING CO.

Efficient Root-Canal Clearing



For more than a quarter of a century dentists have been proving and approving the efficiency of the **Donaldson Pulp=Canal Cleanser.**



Its three strong features are the round tapering shaft, the spiral barbing, and the spring-temper.

It can be entered into the canal with a screw motion; its spring-temper gives notice of any obstruction; it can be released if jammed by unscrewing a trifle; and the backward slant of the barbs gives an all-round hold on the pulp in withdrawal.

The all-round barbing makes the Donaldson Cleanser especially effective in enlarging the canal by a push and pull motion.

Five Sizes,—Extra Fine, Fine, Between Medium and Fine, Medium, and Large,—in boxes and packages of a half dozen, separate sizes and in various assortments.

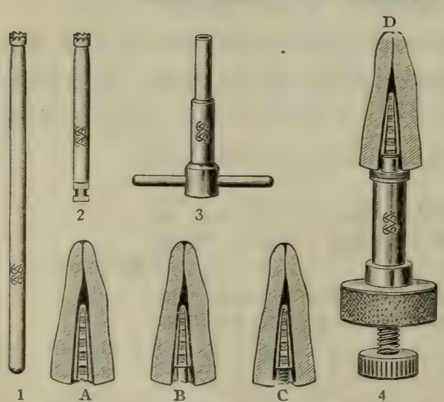
Without handles (Short or Long) ....per half doz. $0.75

With handles (Short or Long) ....per half doz. $1.25; each .25

Send for Catalog.

THE S. S. WHITE DENTAL MANUFACTURING CO., Sole Sales Agent

S. S. White Post-Extractor



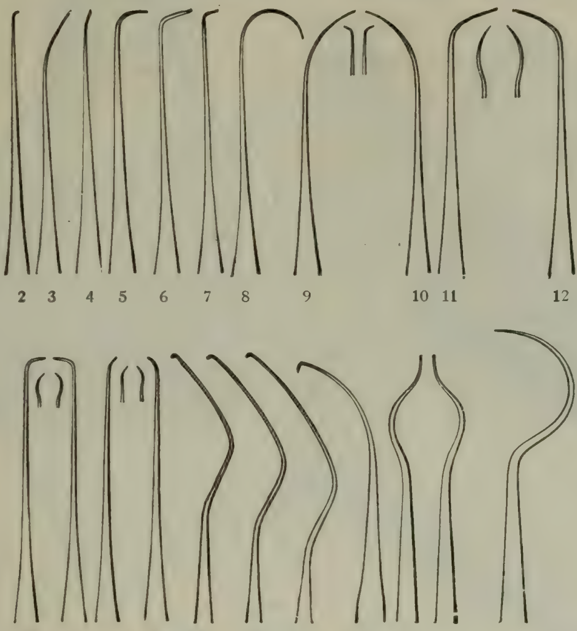
1, Trephine for direct, and 2, Trephine for angle handpieces.
3, Screw-stock.
4, Post-extractor.
A, B, C, D, post and root at various stages of the operation.

Removing a broken dowel-post from a root is a ticklish job with ordinary appliances. With the **S. S. White Post-Extractor** it is simplified and made easy and sure. You merely reduce the broken end of the post,—tenon it,—cut a thread on the tenon, apply the Extractor, and the stump of the post is lifted out without injury to the root. Accompanying the Extractor are a trephine for making the tenon, and a screw-stock for cutting the thread. The set is complete and a beautiful example of the application of mechanical principles to the solution of a vexing problem.

Complete set in box $4.00

THE S. S. WHITE DENTAL MANUFACTURING CO.

FINDING the CAVITIES and PROVING the FILLINGS



In all its uses a properly made Explorer acts as an extension and refinement of the tactile sense of the trained fingers of the dentist. Passed over the surface of a tooth or its roots it locates definitely the most minute cavity; tells the size of the cavity, gives accurate information as to its shape; and after the cavity is filled it reveals any defects, especially at the margins.

The delicacy of this work and its importance, are recognized in the making of the

S. S. WHITE EXPLORERS

The points are fine,—not sharp,—the shanks thin and spring-tempered. The points will stop at the most minute nick in the surface, the spring-tempered shanks will instantly carry the signal back to the fingers.

The twenty-three forms provide for the exploration of any surface.

Octagon Handle ....**each $0.25**
Cone-Socket Points .... **" .16**

An All-Sufficient Reason

The one all-sufficient reason for the high reputation of the **S. S. White Steel Instruments** is that there are no "seconds" and never have been.

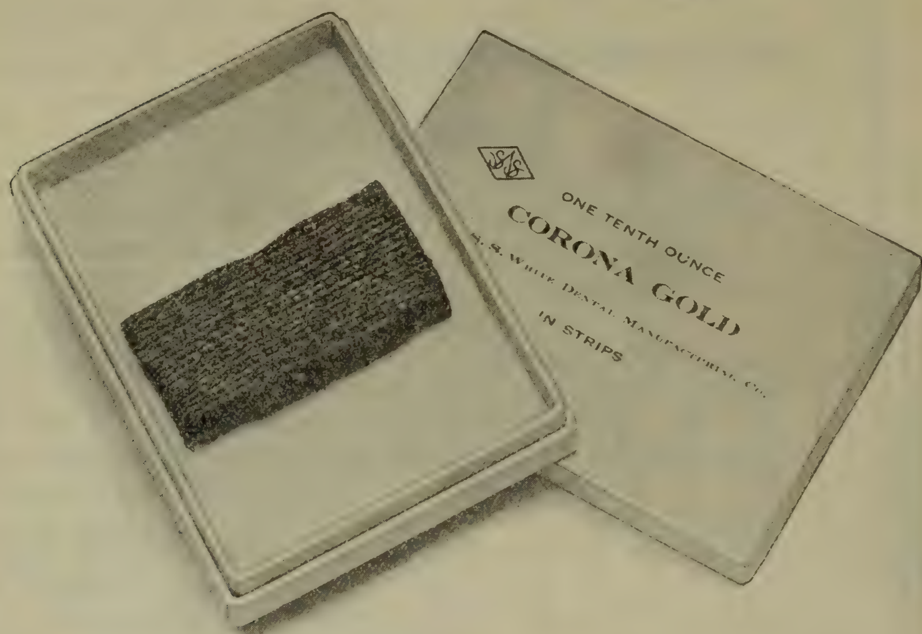
Every instrument we make is inspected, tested more severely than it ever will be used in practice, and again inspected before it can get into our sales stock. If it doesn't pass, no man can buy it; the scrap-heap is its proper abiding place.

This is how S. S. White Instruments made their reputation, and why they hold it: They are carefully made of the best steel for the purpose, by men trained to regard quality as a greater desideratum than quantity; and then defectives are carefully culled out. That is also why S. S. White Instruments are dependable in their efficiency.

Let us send you Catalog free.

THE S. S. WHITE DENTAL MANUFACTURING CO.

Pure Gold in Its Most Practical Form, for Fillings



Pure Gold is with practical universality conceded to be the best material known for filling tooth cavities,—the one which of all others is most permanent, surest to hold its place and preserve the tooth.

This much being granted, the next thing is to find the form of pure gold best adapted to the needs of the dentist, the one that is quickest and surest in placing, that makes the most *solid* and enduring filling.

You'll find it in

CORONA GOLD

pure gold in its most adaptable form, elongated fibers intricately interlaced, every fiber instinct with the full cohesiveness of gold, ready and willing to weld into a solid mass at the touch of the instrument. The fibers are closely compacted, and Corona "fills" fast because of its ready condensation. The rapidity with which it can be worked into a dense, resistant, dependable filling makes it a time-saver, in spite of the fact that, because of its extreme cohesiveness, it must be packed in small portions.

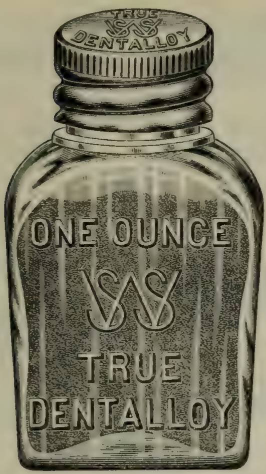
It only requires a trial to demonstrate its value and make it your reliance for gold work. If you don't know it, get a trial package and be convinced.

Corona Gold is put up in 1/10 ounce,—1/40 ounce for trial,—packed in cotton wool, which prevents consolidation during transportation. Always in strips for the readier convenience of the dentist.

Per 1/10 oz.	**$3.75**
" " " in lots of ½ oz. or over ....**per oz.**	**36.00**
" 1/40 "	**1.00**

THE S. S. WHITE DENTAL MANUFACTURING CO.

True Dentalloy Meets Every Need



An alloy (amalgam) filling must be free from shrinkage; otherwise the filling will leak. True Dentalloy never shrinks in the slightest.

An alloy (amalgam) filling must be free from flow; otherwise it would spread out under the force of occlusion. True Dentalloy is free from flow.

An alloy (amalgam) filling must have sufficient strength to withstand the blows of mastication. True Dentalloy has that strength.

And so through the list, True Dentalloy passes every reasonable test. It is dependable in its characteristics, is always the same in working qualities and in the results it gives. It is balanced, to free it from shrinkage and flow, and as a sure guard against the worst of all defects—shrinkage—it is given a slight initial expansion.

This expansion never exceeds three ten-thousandths, an expansion which is known to be good for the filling,—makes it hug the walls tighter,—and it all occurs at the beginning of the setting. In a short time the expansion limit is reached, and thereafter the filling is unchangeable.

Because of its reliability True Dentalloy has made an enviable record in the fourteen years it has been before the profession. It is the silver tin alloy to tie to, and its price is low.

In 1-ounce screw-cap bottles,—powder or shavings,—always a full ounce of the alloy.

True Dentalloy	**per oz.**	**$1.50**
" " in 5-oz. lots	**"**	**1.40**

The Relative Purity of Mercury

The one important thing about Mercury used in mixing dental alloys is that it shall be as nearly chemically pure as you can get it. Analysis of **S. S. White Mercury** shows it to be 99 149/150% pure. In mixing an amalgam about as much alloy as mercury is used. That would make the proportion of impurity 1/300 of one per cent. or 1/30000 of the mix, which in a mass of the size of the average filling would be noted as a "trace," and therefore negligible. You can't get mercury any closer to chemical purity in practical quantities than this which is labeled "S. S. White."

Put up in ¼-lb. bottles, ¼-lb. wood holders, and 1-lb. jugs. The jug is the most economical size to buy.

In bottles, ¼ lb.	**$0.60**
In wood holders, ¼ lb.	**.60**
In jugs, 1 lb.	**2.25**

THE S. S. WHITE DENTAL MANUFACTURING CO.

A Dentifrice,—

to obtain the indorsement of the dental profession, must have real value as a help in the care of the teeth, and must be free from injurious characteristics.

to attain a permanently wide popularity among their patients,—the public,—it must have a flavor so agreeable that its use is a pleasure, not merely a duty.

A little more than half actual size

Any dentist can confidently recommend the S. S. White Tooth Paste to his patients. Its formula was worked out with full knowledge as to what is necessary and useful, and what is harmful, in such a preparation, gained from seventy years of the closest possible touch with the dental profession. The ingredients that compose the Paste are of the finest quality obtainable, and their compounding is a triumph of the pharmaceutist's art.

Patients cannot help being pleased with this Paste. Its flavor—a mint modified with expensive oils—is delicious and lasting. It is slightly saponaceous in action, and has sufficient abrasiveness to rub off a forming precipitate, but not enough to affect the enamel of the teeth. It is a perfect cleanser, removes all unpleasant odors and leaves the mouth with a persistent sense of cleanliness. Aside from its attractive flavor and actual merit as a cleanser, it is agreeable to use because it is neither too thick nor too thin; flows readily from the tube, and will not slide off the brush.

We supply the same Paste, carbolized, for use where more active medication is necessary.

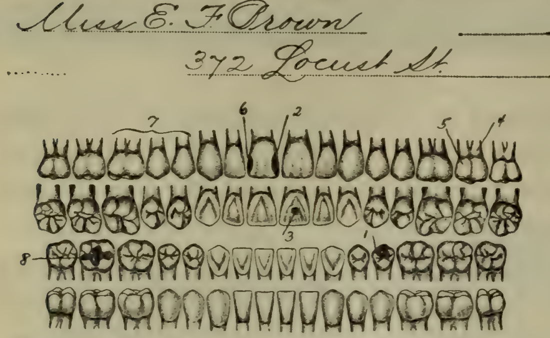
Either variety in 2-oz. collapsible tube $0.25

Dentists who order S. S. White Mouth and Toilet Preparations in lots amounting to $5.00 (or more) at retail are entitled to a discount of 25 per cent. The discount applies to all the articles listed in our Circular No. 1345, and the lots may be confined to a single article or made up of any selection. When Floss Silk is included, the discount is reckoned on the dozen prices.

THE S. S. WHITE DENTAL MANUFACTURING CO.

Bettering Your Bookkeeping

THE ENTIRE STORY OF AN ACCOUNT



1911 DATE	NO		HRS	DR	CR
Nov 2	1	Amalgam Filling	1	2.00	
5	2	Gold "	1¾	5.00	
10	3	Abscess Treatment and Filling	3	6.00	
17	4 5	Treatment and Gold Crown	5	15.00	
21	6	Gold Filling	1	2.50	
28	7	3 Tooth Bridge	7	30.00	
30	8	Alexander Gold Inlay	1½	6.00	
				66.50	
Dec 3		By Cash			20.00
" 11		" "			40.00
" 17		" "			6.50
					66.50

Example of the use of Record Card of No. 2 Card Index System
Actual size, 5 x 7 inches

The time approaches for the annual settlement of accounts,—the best time also for changing your method of keeping them, provided you can better it, because after settlement you'll have fewer accounts to transfer.

You *can* better your method unless you are already using the **S. S. White Card Index System No. 2,** the embodiment of simplicity and elasticity in the keeping of dentists' accounts.

Each account is kept on a single card that shows the detail of every charge made and of every payment received; because each account is opened once for all, no new books are ever necessary; new accounts only mean additional cards, dead accounts are easily eliminated.

These cards are known as Record Cards. Alphabetical Guide Cards, in three different colors,—separate accounts for work which is in progress, from finished work not paid for and these again from accounts which have been settled in full.

You save labor by this system and you can learn almost instantly the state of any account.

Booklet, "Simplified Dental Bookkeeping," will be sent on request. Ask your dealer, or, better still, have a salesman show you.

Complete outfit in black japan tin case, with lock—300 White Bristol-board Record Cards, with full sets of Buff, Salmon and Blue Bristol-board Guide Cards, 15 Cash or Bill Cards, 50 Examination Blanks No. 3 - - - - - - - - $5.00

Extra Cards, Guides, and Examination Blanks can be bought as follows:

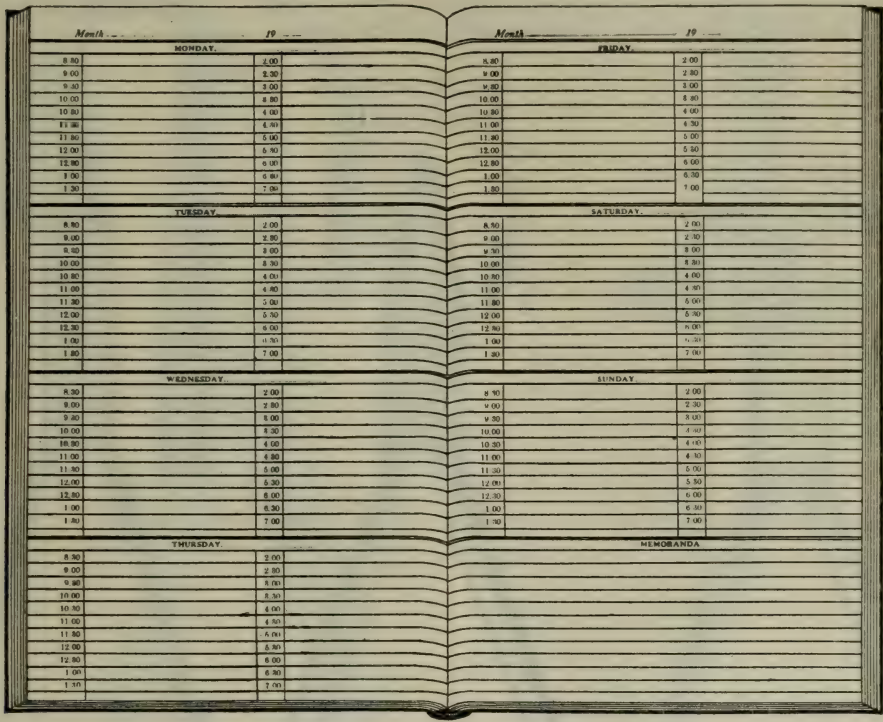
Extra Record Cards	per hundred	$0.75
" Cash or Bill Cards	package of twenty-five	.25
" Alphabetical Guides, Buff, Salmon or Blue	per set	.50
" Guides, set of three colors		1.50
" Examination Blanks No. 3	pad of fifty	.15

Prices for No. 2 Card Index System, with Record and Cash or Bill Cards ruled for pounds, shillings and pence, same as above.

Sample Record Cards and Guides for practical test free on request to your dealer.

THE S. S. WHITE DENTAL MANUFACTURING CO.

A Perpetual Form of Appointment Book



Two features of the **S. S. White Every-Day Appointment Book** will strongly commend it. It is charted for an appointment every half-hour from 8.30 A.M. to 7.00 P.M., and opened at any page it shows the appointments for a full week of seven days, with space for memoranda.

It has appointments for fifty-four of these weeks, a page for each month's cash account and for a yearly summary. Calendered for four years. Convenient size 5¾ x 9 inches. Substantially bound in rich red Pantasote; looks well and will wear well.

Perpetual in form; can be started any time, used any year $0.75

Perfection Polishing Strips are—

Very *thin,* will enter narrow interspaces.
Extremely *tough,* will stand the see-sawing of work.
Properly *charged,* will hold the polishing powder till worn off.

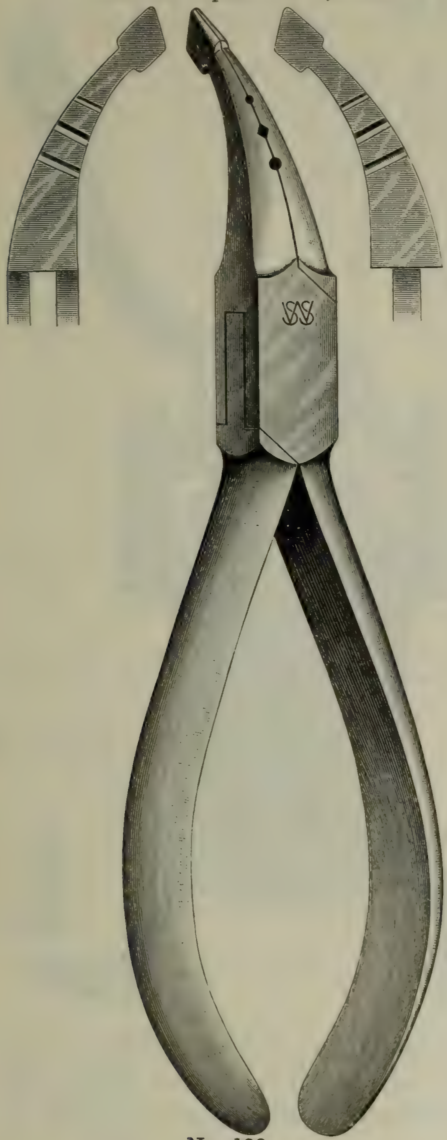
Six Varieties:	Very Coarse	Coarse	Medium	Fine	Very Fine	Finest
	Garnet	Emery	Carborundum	Lava	Flint	Cuttle-Fish

Separate or assorted. Per box of 144 .... $0.40

THE S. S. WHITE DENTAL MANUFACTURING CO.

Angle's Band-forming Pliers

Devised by Dr. Edward H. Angle
Patented September 13, 1898



No. 123

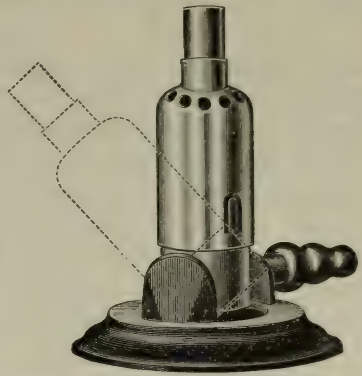
These Pliers are especially designed for pinching or forming the plain bands about the crowns of the teeth in regulating, or to the roots in crowning.

The curve of the beaks and the number of operating edges adapt them to forming the seam on the lingual or labial surfaces of teeth in either jaw.

Between the beaks are square and round grooves for holding round and square wire, etc.

Band-Forming Pliers, No. 123 . . . . $3.25

Laboratory Burner No. 23



Burner No. 23 of our list affords an intensely hot Bunsen flame for soldering, which you can raise, lower, or incline at pleasure; it is a convenient waxing burner, as by inclining it you prevent drip wax from entering the flame tube or otherwise interfering with its efficient action. Last of all, and perhaps most important, when you want to apply the flame to an investment from below, which many practitioners claim is the proper way, this burner is indispensable.

Its construction is unique. The Burner proper is in two telescoping sections, the inner section trunnioned to a metal base and carrying the gas jet, the outer supporting the flame tube. Air is admitted through the perforations in the cap of the outer section. Raising or lowering this section increases or decreases the amount of air entering the flame tube, and governs the height and intensity of the flame. It also affords a means of allowing for variations in gas pressures. The trunnioning of the Burner enables you to direct the flame at any angle, with both hands free for manipulating the work.

Not the least of the excellences of **Laboratory Burner No. 23** is its small consumption of gas in proportion to the heat it gives.

Price $0.50

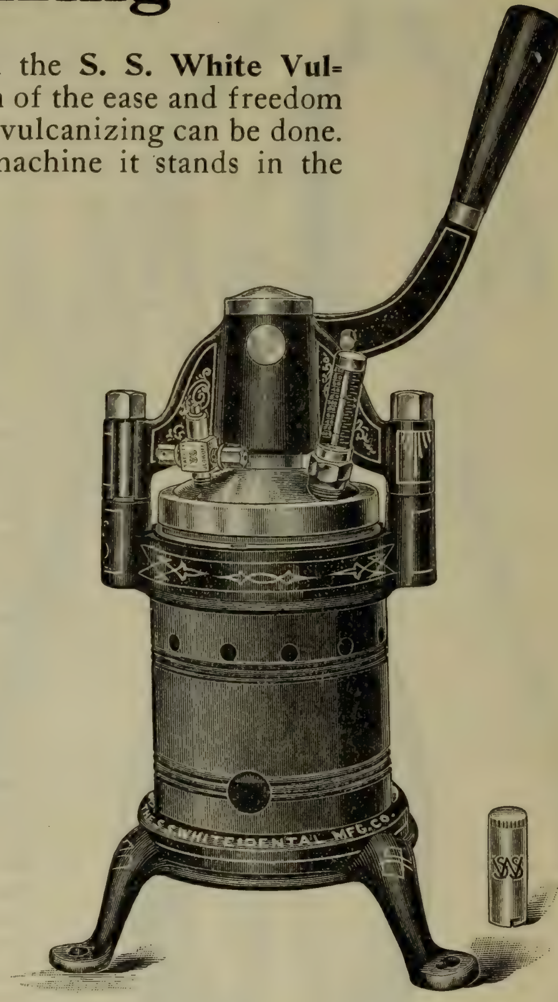
THE S. S. WHITE DENTAL MANUFACTURING CO.

Sole Sales Agent for the Dental Trade

Cleanliness and Comfort in Vulcanizing

One who has never used the **S. S. White Vulcanizer** has small conception of the ease and freedom from annoyance with which vulcanizing can be done.

As a mere vulcanizing machine it stands in the front rank: the seamless copper pot is heavy enough to stand any required strain, light enough to heat up readily; and absolutely steam tight. The lid is held immovably in its seat and perfect vulcanization is sure.



The handling of the lid of the S. S. White Vulcanizer is a feature unapproached in convenience and cleanliness. The lid is attached by a link mechanism to a crane swinging from the jacket collar, and the whole is operated by a cam lever, which lifts and lowers the lid, swings it to one side, and centers it on its seat. The link mechanism has a very fine adjustment and assures a perfect fit between lid and pot collar. The operator need never soil his hands in managing the lid, and the lid will never pick up dirt to cause a misfit. The dirt and uncleanliness of vulcanizing are eliminated.

2-case Vulcanizer	**for**	**Gas or Alcohol**	....	**$25.00**
"	"	" **Kerosene**	....	**26.50**
3-case	"	" **Gas or Alcohol**	....	**27.00**
"	"	" **Kerosene**	....	**28.50**

Prices include complete equipment: 2 wrenches, 1 pot lifter, 2 (or 3) iron "Star" flasks, 1 extra packing, 1 box safety-caps, 1 box soapstone, with gas, alcohol, or kerosene burner, as ordered.

Full details in our Vulcanizing Catalog, free on your call

THE S. S. WHITE DENTAL MANUFACTURING CO.

LAWRENCE'S AMALGAM

Many dentists have used Lawrence's "Old Reliable" Amalgam throughout long-term practices with entire satisfaction to themselves and their patients. One of the oldest alloys,—more than a half century before the dental profession,—always kept to the highest standard. Put up in envelopes, one ounce and half ounce.

Per ounce $2.50; in 5-ounce lots, per ounce $2.00

The S. S. White
Dental Manufacturing Company
Sole Sales Agent

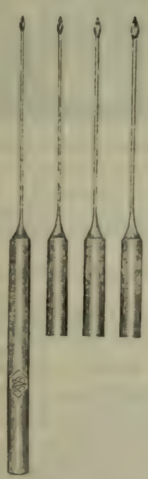
Dentists Should Write

for our booklet B on the "Use of Bacterial Vaccines in Dentistry." It tells of a positive treatment for pyorrhea alveolaris that has never failed to get results, and explains how dentists may fit themselves to specialize in the treatment of this disease. Specializing means added reputation and better fees.

INDIANAPOLIS
BACTERIN LABORATORY

5462 E. Washington St.
Indianapolis, Ind.

ENLARGING ROOT-CANALS



The rational way to enlarge root-canals is to use the Gates-Glidden Drills, the smallest size that will enter first, then the larger in regular sequence, till the enlargement is completed. The points won't cut.

If driven gently, without undue pressure, they merely guide the cutting blades along the course of the canal, giving notice to the operator if it is too crooked for them to follow, thus lessening the chance of accident. In a straight or reasonably straight canal the guide-points will lead the side-cutting blades to the apex.

If jammed slightly in a crooked canal, they can be backed out. If by accident one is broken, the backward taper of the shaft brings the break near the shoulder, so that the broken part is readily accessible for removal.

Each . . . . $0.35 Per dozen $3.50

THE S. S. WHITE DENTAL MANUFACTURING CO.

RADIO

Temporary Cement

Crown and Bridge Inlay Copper Cement

The very *latest* and *best* Cements for temporary and permanent fillings. We give you equal the *quantity* you have formerly bought at *HALF* the price.

We do not contemplate revolutionizing the dental profession by this startling announcement, but we want you to give RADIO cements a thorough trial, and if they are not all we claim for them, we will cheerfully refund your money.

RADIO TEMPORARY CEMENT is unequalled for sealing medicaments and sensitive cavities prior to permanent metallic fillings, and is germicidal. It is *non-irritant* and a non-conductor. Easy to insert and remove.

Gray and Dark Pink Powder and Liquid, per box $ .50. Powder or Liquid, per box $ .25

RADIO CROWN and **BRIDGE INLAY COPPER CEMENT**—to be obtained in four shades: Gray, Yellow, Pearl Gray and Reddish Brown. Will positively retain their color in mouth and are warranted durable.

Liquid and Powder, per box **$1.00**
Powder or Liquid, per box .... **.50**
Six boxes **5.00**

Sent direct to you by mail, everywhere. If your dealer doesn't sell Radio, insist that he get it

DENTAL PRODUCTS COMPANY, Inc.
44 Clinton Street Newark, N. J.

WILSON'S COREGA (POWDERED)
Registered in U. S. Pat. Office

Used and Endorsed
by Leading Prosthetic Dentists

THE full measure of denture-making efficiency, fit and comfort being of first importance, can best be secured by its use. ¶ To restore and keep the mouth in a healthy condition, use and recommend COREGA. When the gums shrink or swell it will adjust the change.

Three Sizes of Sanitary Sifting-Top Cans. Prices in U. S. A., 50c, $1.00 and $2.00

Just one 50c Can FREE to every dentist. If you haven't had yours write for it TODAY.

Your Name ____________
Address ____________
Dealer's Name ____________

Sold by Dental Supply Houses
COREGA CHEMICAL CO.
208 W. St. Clair Av., Cleveland, O.

ZHONGIVA

For the Mouth and Gums

Earnestly commended to the profession as **a positive, prompt** and **reliable** adjunct in their treatment of Alveolar Pyorrhea and all inflammatory or sore conditions of the Oral Cavity, Recession, Gingivitis, etc.

Send for sample
We solicit a trial

JAMES J. OTTINGER
Manufacturer
20th & Spruce Sts., Phila., Pa.

SEND YOUR Pumice Sweeps, Gold and Platinum Scrap and Filings, Old Bridges, etc., for refining. We will remit promptly by cash, or, if you choose, by its equivalent in new gold or Niagara Brand Solders. Your material held here, intact, awaiting your acceptance of bid, and returned to you at our expense if unsatisfactory. A record of square dealing since 1879 should be a guarantee of the same square deal to you.

A. ROBINSON, ASSAYER AND REFINER
3 Catharine Street - New York

IF you don't know why the long-time life test in the mouth is the most important of all amalgam tests, send for the new booklet on *Scientific Standards and the Standard Alloy.*

ECKFELDT & DuBOIS
1314 ARCH STREET
PHILADELPHIA

Another Case

That found satisfaction in the "EUREKA" after being without a plate for five years.

Thousands have proven the "EUREKA" to be perfect by its simple renewing feature on and off in a second by patient. Worth remembering.

Upper or Lower, $2.00 per Box of Six

EUREKA SUCTION COMPANY, Loudonville, O.

Polishing and Buffing Motors

for either alternating or direct current, with one polishing and one buffing attachment and variable speed, at

$14

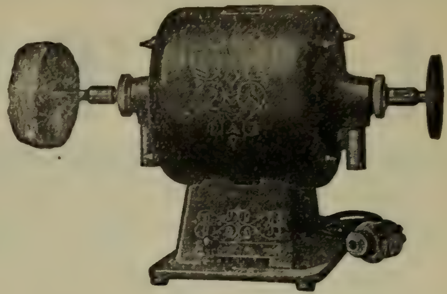
No dentist can afford to be without it.

$14

We make larger motors also.

Write for particulars.

FIDELITY ELECTRIC CO., Lancaster, Pa., U. S. A.



To the Graduating Dentist—

Next year you will need an electric lathe.

You will want one that does its work well.

—Is convenient to use.

—Will give you long years of good service.

—Is moderate in price.

You will find all these in the

Westinghouse Electric Dental Lathe

of famous Westinghouse quality throughout. Designed especially for dentists' use.

Prices include dental lathe, complete set of Ritter chucks, carborundum, buffing and brush wheels and double-grooved pulley.

Direct Current,	115 volts . . .	$45
" "	230 " . . .	46
Alternating Current,	110 volts.	50
" "	220 "	51

The set of Ritter chucks can be omitted, when desired, with a reduction of $6.00 from the above prices. Write for folder 4257 for complete description.

Westinghouse Electric and Mfg. Company

East Pittsburgh **Pennsylvania**

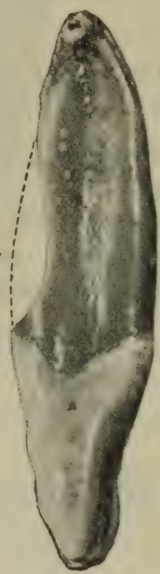
KOLYNOS

dissolves bacterial plaques and removes mucoid deposits without causing abrasion at the *enamel margin.*

If three minutes action of a two-inch brush-wheel charged with prepared chalk will make a cut like

← **THIS** →

Is it not well to know the formula of the dentifrice you prescribe, and to test it for abrasive qualities?



A careful test may explain those numerous cases of *sensitive necks of teeth.*

THE KOLYNOS COMPANY

NEW HAVEN, CONN.

Please Note that We Have Not Increased the Prices of Any of Our Products

TRIGEMIN

is an

Analgesic and Sedative

of Highest Therapeutic Merit

Its use is especially indicated in painful affections of the direct central nerves. Trigemin is of great value in

NEURALGIA	PERICEMENTITIS
PULPITIS	EXPOSURE OF PULP
PERIOSTITIS	MIGRAINE
INSOMNIA due to pain caused by irritation of dental nerves.	POST OPERATIVE PAIN

WE ALSO CARRY THE

Novocain=Suprarenin Products

PROF. FISHER'S MODIFIED RINGER TABLETS

N. S. TABLETS E — N. S. PLUGLETS

as well as

ANAESTHESIN	ORTHOFORM
VALYL	L-SUPRARENIN SYNTHETIC

FARBWERKE-HOECHST COMPANY

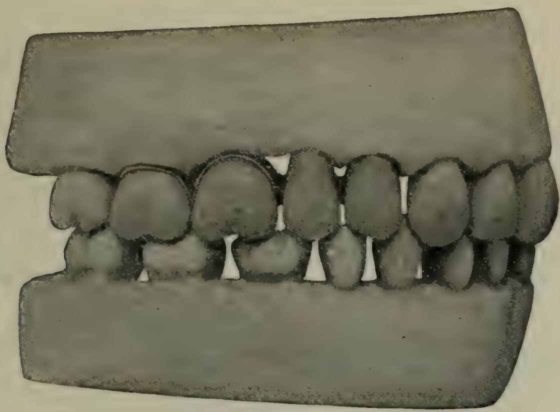
Pharmaceutical Department

H. A. METZ, President — NEW YORK

GosLee

CROWN AND BRIDGEWORK

The Standard of Modern Dentistry



The simplicity of its technique, the full porcelain cusp, the life-like appearance, the absence of gold, the lower cost, the unusual strength, the interchangeable feature, are only a few of the attractive advantages making the GosLee Tooth so popular in the practice of

MODERN DENTISTRY

FOR SALE BY LEADING DEALERS

SEND FOR BOOKLETS

CONSOLIDATED DENTAL MFG. CO.

Main Office: 130 Washington Place, New York

Chicago: 29 E. Madison St.
Philadelphia: 1419 Real Estate Trust Building
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New York: 45 West 34th Street

Tufts College Dental School

HUNTINGTON AVENUE, THE FENWAY, BOSTON, MASS.

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PRELIMINARY EDUCATIONAL REQUIREMENTS

For the session 1914-1915 the minimum educational standard for unconditional matriculation is 60 counts based upon the subjects specified in the Catalog for that session, or in other subjects representing High School work; or upon the equivalent of these counts in High School subjects attested by certificates or diplomas issued by approved High Schools or literary colleges. Applicants may be admitted upon a minimum of 45 counts upon the condition that 15 additional counts shall be made up before entrance upon the second year of the course.

FEES

Matriculation Fee (paid once only)	$5.00
Fee for one Course of Lectures	150.00
Gymnasium and Howard Houston Club, Membership Fee each year	10.00
Dissecting Fee, including material—First and Second Year, each	6.50

THE ANNUAL SESSION

The session 1914-1915 begins Friday, September 25th, and ends at commencement, the third Wednesday in June. (No student admitted to the regular course after October 10th.) The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalog.

The course of instruction extends over a period of THREE YEARS.

In order to facilitate work in the practical branches and to economize the student's time, the regular session is so arranged that students during the first year are required to devote the time equally to DENTAL HISTOLOGICAL AND CHEMICAL LABORATORY WORK. During the second and third years the student has practically the entire forenoon of each day for dental work. Thus ample opportunity is afforded for practice in OPERATIVE AND MECHANICAL DENTISTRY. In the latter branches the students of the first year are divided into sections, devoting the time not otherwise engaged to practice in the operating rooms.

PLAN OF EXAMINATION

The gradation of the course enables the First-year student to present himself for examination in the following branches: CHEMISTRY, ELEMENTARY MATERIA MEDICA, HISTOLOGY, and ANATOMY, including OSTEOLOGY and MYOLOGY. OPERATIVE AND PROSTHETIC TECHNICS. The Second-year student will be examined in MATERIA MEDICA. BACTERIOLOGY. APPLIED ANATOMY and PHYSIOLOGY, and on the progress in OPERATIVE and MECHANICAL DENTISTRY. Such an arrangement is economical not only in point of time, but also in facilitating a student's acquirement of knowledge in the remaining branches.

The final examination at the close of the third year is in OPERATIVE DENTISTRY, MECHANICAL DENTISTRY, DENTAL PATHOLOGY AND THERAPEUTICS, AND ORAL SURGERY.

All applicants for advanced standing must pass the required examination of this school, or furnish proof that they have passed EQUIVALENT examination in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

The New Dental Educational Institute

By a formal agreement executed June 15, 1912, by the Trustees of the University of Pennsylvania and The Thomas W. Evans Museum and Institute Society, a co-operative affiliation is now established between the respective corporations whereby the resources of both will be utilized in carrying out the intent and purposes expressed in the will of the late Dr. Thos. W. Evans, in which he directed that the residue of his estate be applied to the creation of a dental educational institution to be located at the Northwest corner of Spruce and Fortieth sts., in the city of Philadelphia, and to be carried on "as such institutions of learning are now conducted in Philadelphia and not inferior to any already established." Plans for the new Dental Institute which will house the School of Dentistry of the University of Pennsylvania have been completed, and it is expected that the new building will be ready for occupancy at the session beginning September 25, 1914.

The lot at Fortieth and Spruce sts., upon which the building will be constructed, is 270 by 175 feet, and the building will be 242 feet long by 161 feet wide. The style of architecture is collegiate Gothic, of the time of Henry VIII, and will be in keeping with the architecture of the law school, dormitories, zoölogical, medical, engineering and other recently constructed buildings of the University. The material will be of Indiana limestone and hard burnt red brick. The building will be in the shape of the letter H, and will consist of three stories over a high basement.

Of the several interesting features of the building, two will be the Museum proper and the square tower, which is to be built at the main entrance at the center of the Spruce st. wing. The tower will be 38 feet square, rising 84 feet. In the center of the tower, beginning at the second story and reaching almost to the top of the third floor, will be a large window, which will light the library, to be placed on the second floor.

By formal action of the Trustees on June 8, 1914, the courses in dentistry of the University of Pennsylvania are opened to women upon the same terms as to men.

The Evans Museum, which will occupy the east half of the Spruce st. wing, will be as nearly fire- and burglar-proof as modern science can make it.

Another of the important features of the building is the large operative clinic, in the north wing on the second floor. This occupies the entire wing and contains one hundred and thirty-five specially designed operating chairs, with instrument cabinets and gas, electricity, water and compressed-air service, at each chair. On the north side is a wall of glass, as far as is possible in keeping with the strength of the building. The clinic is two stories high, 30 feet in all, and the glass in the wall is turned over the roof a distance of about 10 feet, giving all the daylight possible.

In the scheme of educational work of the Institute provision has been made for undergraduate training for the dental degree as required for legal qualification for the practice of dentistry, postgraduate instruction on the elective system, and opportunities and facilities for scientific research in dental subjects.

In consequence of the affiliated interests of the two institutions, the students of the Evans Institute are accorded all of the advantages and University relationships now enjoyed by students of the Dental School of the University, including the resources of the University for furnishing instruction in the fundamental medical and dental departments, its social, educational, and athletic advantages.

The students of the Dental School of the University in return for these concessions enjoy the advantages of the new building erected by the Evans Institute Society, and its material resources for the conduct, maintenance, and improvement of the same.

It is the expectation that, when completed, the new School will constitute the largest, most complete, and efficiently organized dental educational institution in existence, in the several phases of undergraduate, postgraduate, and dental research work.

Board can be obtained at from five to eight dollars per week, according to location and accommodations.

FOR DETAILED INFORMATION AND ANNOUNCEMENTS, ADDRESS

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